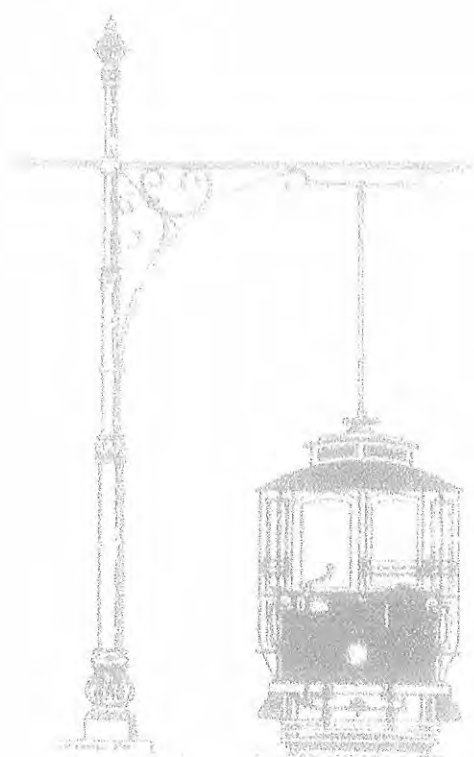


# **SYDNEY TRAMWAY MUSEUM**

**NOMINATION**

**FOR**

**HISTORIC ENGINEERING MARKER**



**SYDNEY TRAMWAY MUSEUM**

**INSTITUTION OF ENGINEERS AUSTRALIA**

20 th September 2000

Don Cottee  
Chairman  
Engineering Heritage Committee  
Sydney Division

Commemorative Plaque Sub-Committee  
The Institution of Engineers Australia  
Engineering House  
11 National Circuit  
BARTON ACT 2600

**Re: Nomination for Historic Engineering Marker  
Sydney Tramway Museum**

The following work is nominated for a historic Engineering marker:  
Sydney Tramway Museum.

**Location** ,including address and map reference grid :

Pitt Street Loftus, N.S.W. Gregory's Road Directory  
Map 332 Grid H-9

**Owner** : South Pacific Electric Railway Co-operative Society Limited.

The owner has given consent for the nomination of the site and for the placement of the plaque. Correspondence previously supplied.

**Access to site**; From Pitt Street , Loftus, N.S.W.

**Future care and maintenance of the site** : Sydney Tramway Museum.

**Name of Sponsor** : Don Cottee -Sydney Tramway Museum.

Chairperson of Nominating Committee



Chairperson of Division Heritage Committee/Panel

# SYDNEY TRAMWAY MUSEUM- NOMINATION FOR HERITAGE ENGINEERING MARKER

## INDEX OF CONTENTS.

SUBJECT	PAGE
INTRODUCTION	1
MAP OF MUSEUM SITE	2
STATEMENT OF SIGNIFICANCE	3
PLAQUE CITATION	6
LOCALITY MAP	7
BOGIE AND TRUCK TYPES	8
THE YEARS 1903-1908 DEVELOPMENT OF SYSTEM	9
DEVELOPMENT OF ELECTRIC TRAMCARS	29
WHEN HORSE POWER MEANT HORSE	79
THE EXPERIMENTAL ELECTRIC CARS	90
RIDING ON TOP OF THE CAR	98
NEW SYDNEY TRAMWAY MUSEUM OPENED	106
SHORT CAR LONG HISTORY	137
REFERENCES	143



## INTRODUCTION

The Sydney Tramway Museum opened for operation at the Loftus site in 1988 following a move from its original site in The Royal National Park. The Loftus site has been developed as an operating museum and the museum operates a service on the former railway branch line to National Park.

The collection of the museum has representative examples of tramcars which operated in Sydney and traces the evolution of Sydney's Tramcar design from the oldest surviving electric tramcar in Australia.

Apart from the preservation of a significant tramcar collection the museum's activities have preserved and interpreted activities in the Civil, Mechanical and Electrical disciplines of engineering as they developed in the large industrial undertaking of The New South Wales Railways and Tramways and in later years under The Tramways Department.

The Museum site has been laid out with an exhibition hall, operating street with elements from streetscapes of the period of operation, workshops including a transverser and other ancillary buildings.

The museum is celebrating its 50th year and is Australia's oldest tramway museum. The museum has been instrumental in assisting the development of other sites through technological transfer.

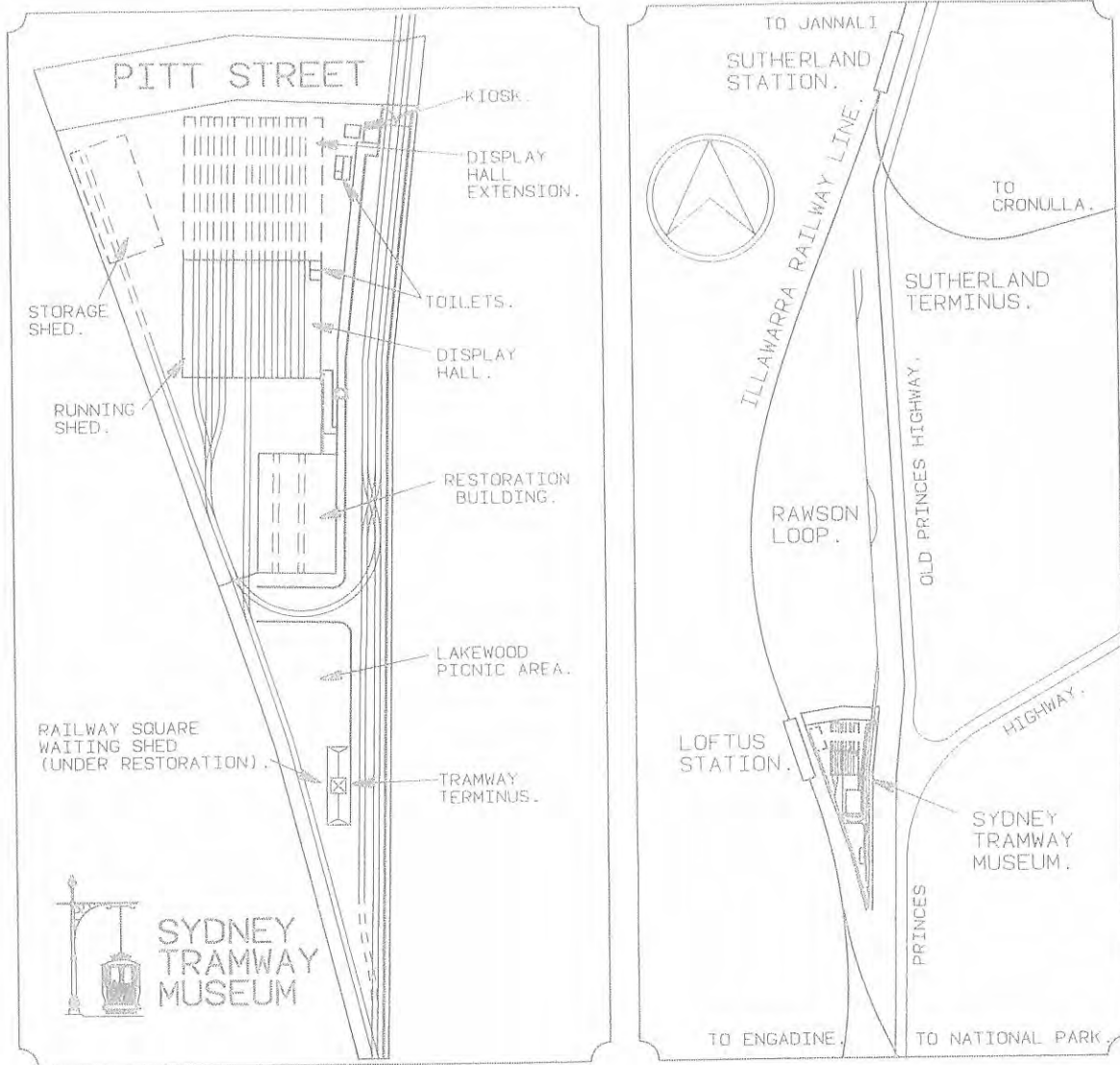
Apart from the faithful interpretation of the technology the museum has displays which give an understanding of the social significance and importance of the system in developing Sydney as a compact city. Suburb names in some locations have been derived from tramway junctions and the term "shooting through like a Bondi tram" became part of Sydney's lexicon.

The museum has made a significant contribution to the preservation of and interpretation of this era of street transportation.





# MAP OF MUSEUM SITE



O CAR AT OLD RAILWAY SQUARE WAITING SHED -LOFTUS

## STATEMENT OF SIGNIFICANCE

Does the object have a high degree of technical and / or creative excellence . ?

The museum houses a transportation collection which preserves the evolution of tramcar design , civil works and electrical distribution of the Sydney Tramway System. The museum was founded 50 years ago , was the first tramway museum in Australia and has been developed to interpret the significance of The Sydney Tramway System when to ride a tram was part of most peoples daily life. The museum's collection has examples that illustrate the evolution of tramcar styles which were needed for local climatic conditions and changing operational requirements. The evolution of the Sydney Tramcar commenced with fully imported examples based on American designs with latter models having a high component of local design and manufacture. The design and interpretation of the site includes an exhibition building , workshops , trackwork to Sydney Tramway standards and other ancillary buildings and elements of the period.

Has it a strong social significance ?.

The collection and museum site provides an interpretive site for one hundred years of street transportation in Sydney 1861-1961. The activities of the museum are linked with the development of Sydney as an international city both culturally and technologically. Whilst the site contains many items of moveable heritage ,the items are significant as they illustrate the development of local manufacture. Apart from technical aspects of exhibits as they represent developments and operating practice of The N.S.W. Government Railways and Tramways the collection as an operating museum is significant in Sydney and Internationally.

Does it demonstrate a way of life, taste custom, process or function of particular interest .?

The site and collection demonstrates the manufacturing techniques of the period. Additionally subject to current standards and operating requirements the site operates to standard practice of the period that it interprets. The workshop and storage areas have been constructed to represent operating practices of the operating period 1900-1940.

Has it a strong association with important people and /or with a development or cultural phase . ?

The growth of Sydney as a compact city was a function of the public transportation system and the tramway system when the riding of tramcars was the common experience. The Sydney Tramway Museum in its 50<sup>th</sup> year is the first tramway museum in Australia and has been successful in collecting and preserving a representative collection of Sydney cars.

Has it landscape, townscape or environmental value, and in particular, has it a considerable degree of unity in its materials, form and scale .?

The collection and its relationship to its surrounding environment has been carefully considered .

Museum Site:

The Museum site has been designed to interpret the operation of The Sydney Tramway System in the period 1900-1940. This has been achieved through the establishment of storage and workshop buildings to an appropriate scale together with other buildings transferred to the site from city street locations when they became redundant to their original purpose. The streetscape has a high townscape and environmental value. The selection of materials are of the period. On the technical side the detailing of trackwork , power overhead wiring and support structures have been constructed to represent specifications of the period .

The Royal National Park:

The museum operates the former branch line of the City Rail System in The Royal National Park. The right of way and the track standards reflect its earlier period of railway operation.

Rawson Avenue.

The track standards in Rawson Avenue have successfully recreated the reserved track standards of the period.

Generally the site has a considerable degree of unity in its materials , form and scale

Is it enhanced by its setting, does it contribute to its setting .?

The museum site is located between two road reserves and the South Coast railway Line. The design and layout of the museum will present period landscape streetscape vistas to public thoroughfares. The architectural component of the site contributes to the setting.

Is it a particularly fine example of its type .?

By national and international standards the museum site is a fine example of an operating transportation museum. The collection of Sydney tramcars traces the evolution of tramcar design for Sydney conditions in the first half of the 20<sup>th</sup> century

Does it represent an important stage in development which influenced later developments .?

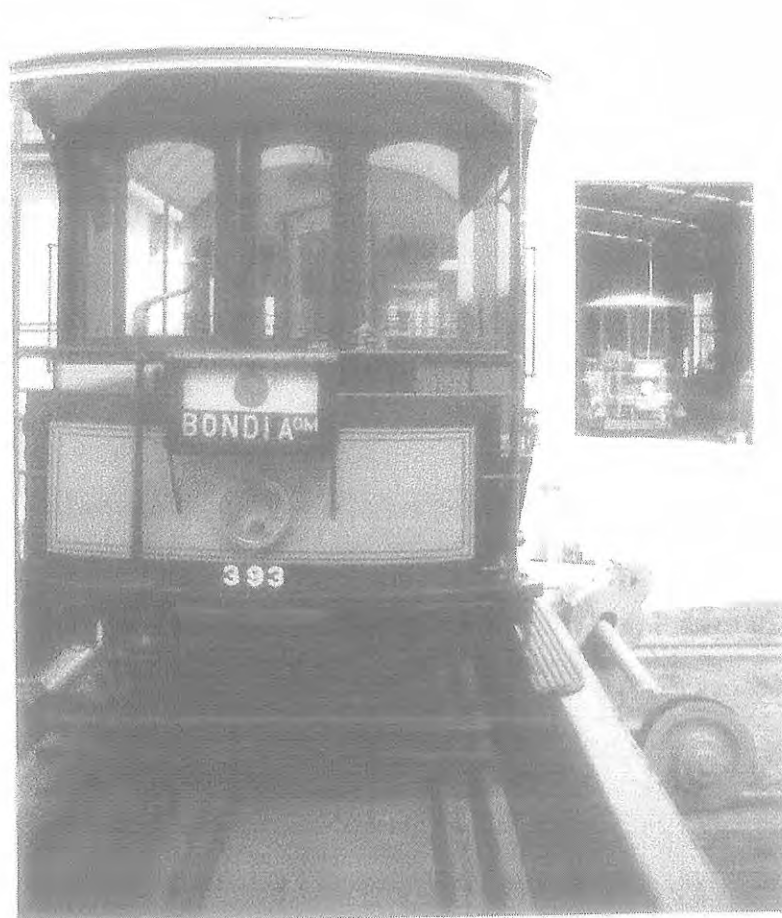
The earlier exhibits of the museum give a clear picture of the evolution of the tramcar in Sydney.

Does it demonstrate technological change .?

The site clearly demonstrates the impact of technological change in the period 1890's to 1920's

Is it the only known or reasonably intact example in the area, or of its type .?

The collection with its representative examples is the most comprehensive in existence. The collection includes the oldest surviving electric tramcar in Australia .



## PLAQUE CITATION

### SYDNEY TRAMWAY MUSEUM

THE SYDNEY TRAMWAY SYSTEM OPERATED FROM 1890 TO 1961 AND WAS ONE OF THE LARGEST IN THE WORLD BETWEEN 1910 AND 1946 WHEN IT CARRIED ABOUT ONE MILLION PASSENGERS A DAY. THIS MUSEUM RECORDS THE SYSTEM'S HISTORY AND INTERPRETS THE ENGINEERING STANDARDS USED, THE DEVELOPMENT OF LOCAL TRAMCAR DESIGN AND THE TRAMWAY'S SIGNIFICANCE IN THE DEVELOPMENT OF SYDNEY. THE MUSEUM'S COLLECTION INCLUDES COMPARATIVE EXAMPLES OF INTERSTATE AND INTERNATIONAL TRAMCARS.

INSTITUTION OF ENGINEERS AUSTRALIA  
SYDNEY TRAMWAY MUSEUM



F car 393 on Transverser – Museum Site 19 th August 2000

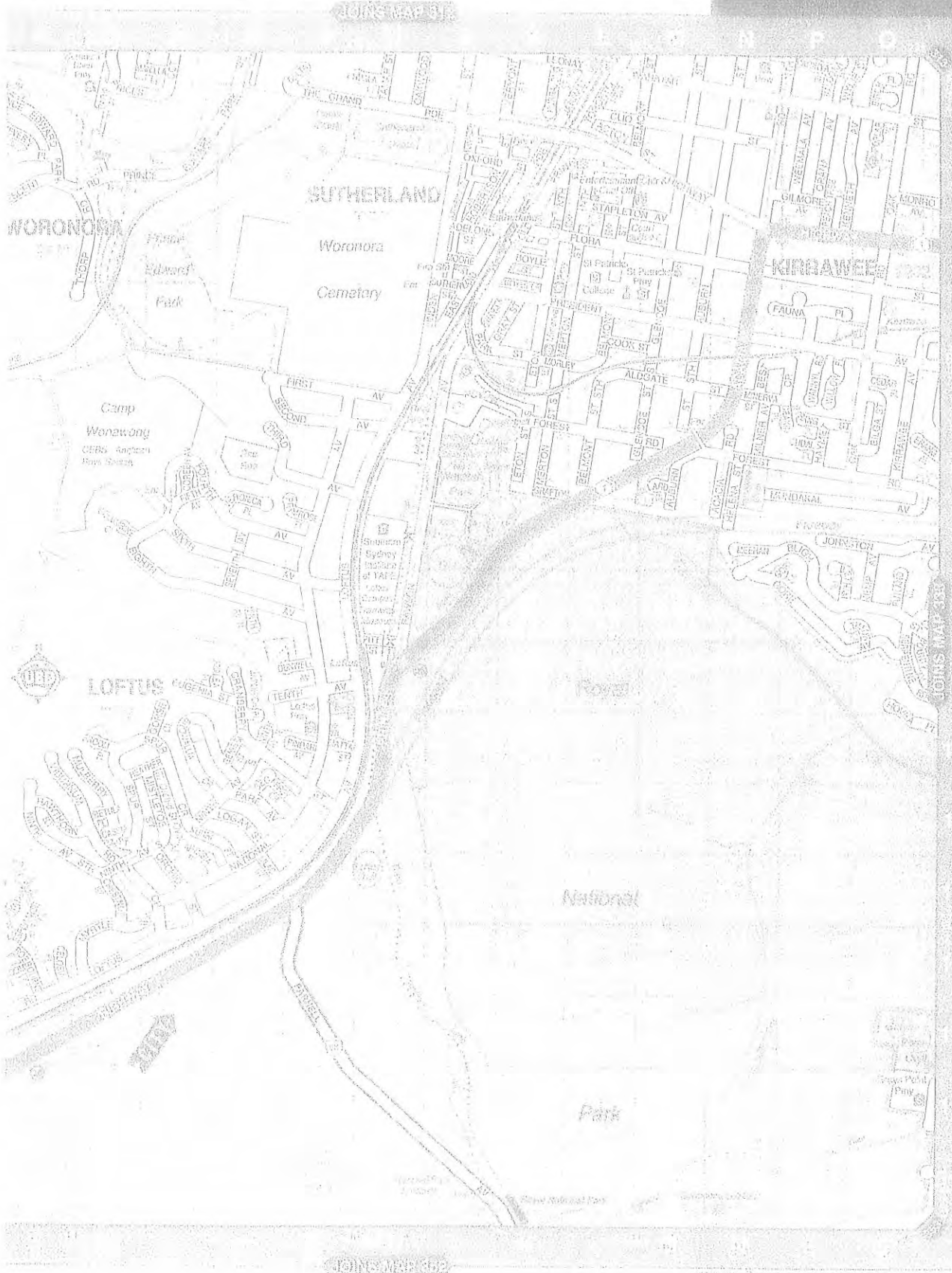


PUBLIC COLLEGE  
 PUBLIC SCHOOL  
 HOUNDARUM  
 SCOUT HALL

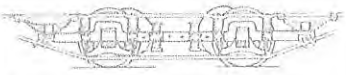
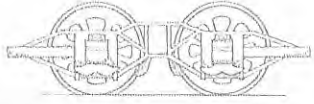
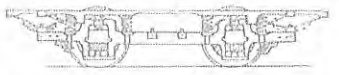
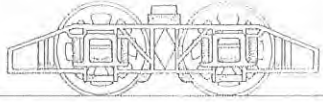
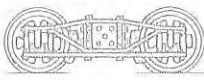
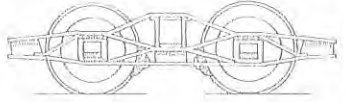
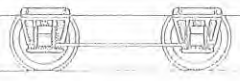
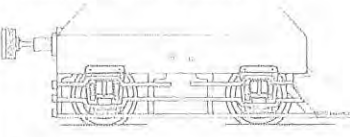
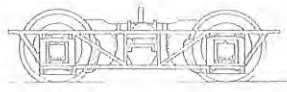
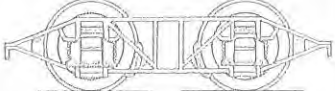
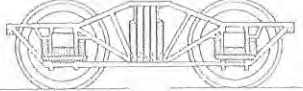
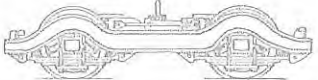
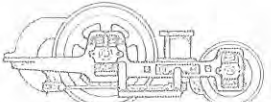

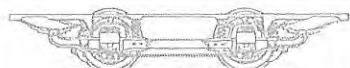
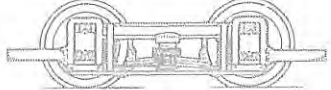

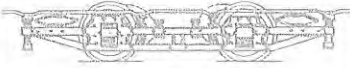

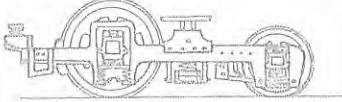


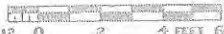
CHRISTIAN CHURCH  
 ST. PETER'S  
 HAWKERS' CLUB  
 DISTANCE FROM GPS

SCALE 1:2500  
 Meter 500 1000

# MAP 332

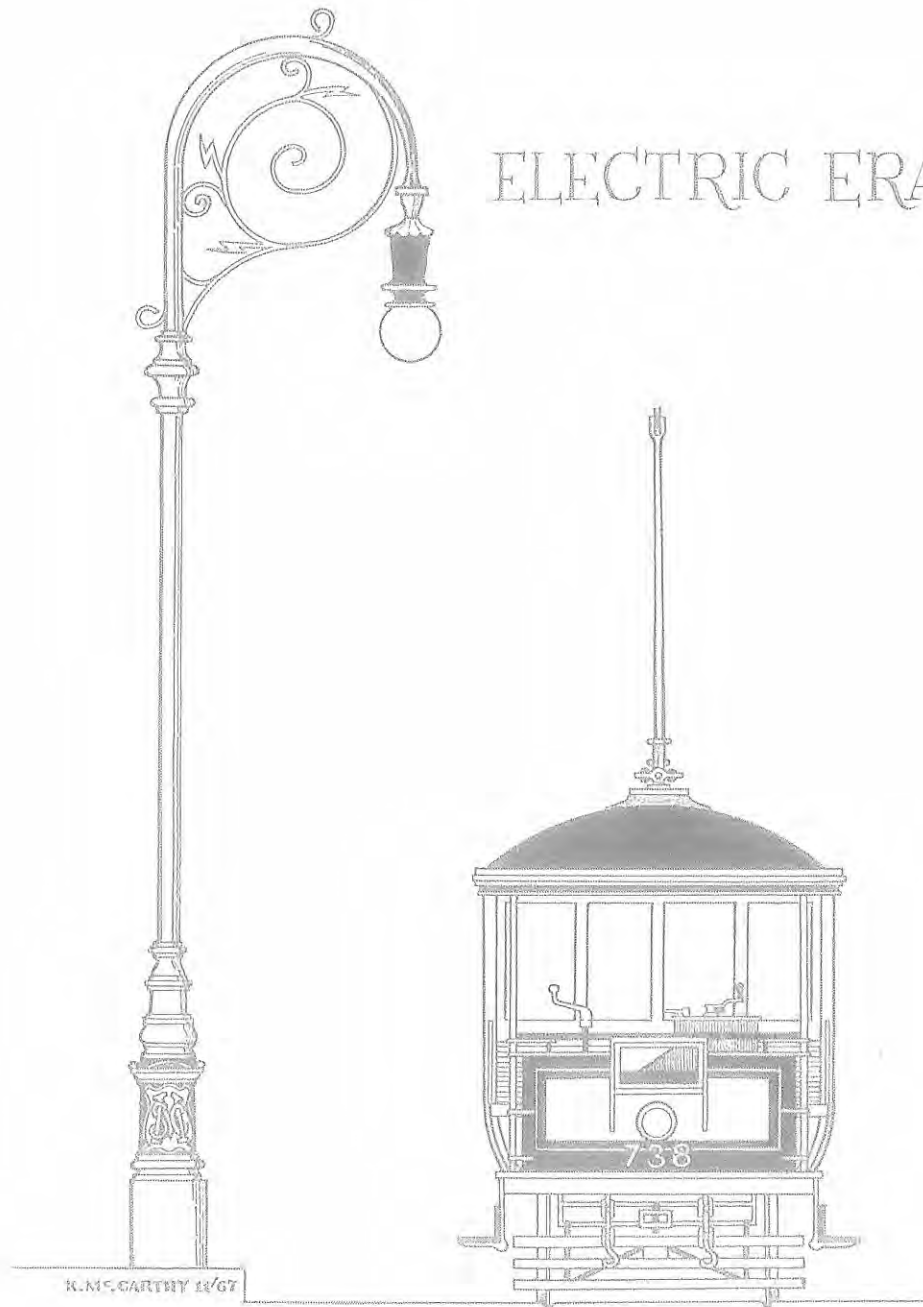


## BOGIE AND TRUCK TYPES

<p>No. 1. BRILL 21E. C, D, E, H, J, K CARS. STEPHENSON CARS.</p>  <p>A SCALE.</p>	<p>No. 2. O, O/P CARS. No. 3. U, W CARS.</p>  <p>B</p>	<p>McGUIRE COLUMBIA. I CARS</p>  <p>A</p>
<p>No. 4. O CARS, O/P CARS.</p>  <p>B</p>	<p>No. 5. B CARS. X SPRINKLER.</p>  <p>B</p>	<p>No. 6. U, W CARS.</p>  <p>B</p>
<p>CABLE TRAILERS.</p>  <p>B</p>	<p>COUNTERWEIGHT DUMMY.</p>  <p>B</p>	<p>No. 9. P CARS, P/R, P/Ri CARS.</p>  <p>B</p>
<p>No. 10. W CARS.</p>  <p>B</p>	<p>No. 11. "DIFFERENTIAL" U CARS.</p>  <p>B</p>	<p>No. 12 R CARS. No. 13 Ri CARS.</p>  <p>B</p>
<p>McGUIRE - FREIGHT CAR, U CAR.</p>  <p>B</p>	<p>BRILL 22E. F, BRILL G, L, M, N, L/P, PRISON CAR.</p>  <p>B</p>	<p>McGUIRE AL. E CARS.</p>  <p>A</p>
<p>BRILL 27G. W CARS.</p>  <p>B</p>	<p>HEARSE CARS.</p>  <p>B</p>	<p>PECKHAM. C, D, E, J CARS. METROPOLITAN</p>  <p>A</p>
<p>"ESSAFEE" RAIL GRINDERS.</p>  <p>B</p>	<p>"AMERICAN CAR COV." G CARS. PECKHAM H D 2</p>  <p>B</p>	<p>BEMIS. STEPHENSON CARS.</p>  <p>A</p>
<p>N.S.W. TRAMWAY TRUCKS.</p>	<p>"A" SCALE.  INCHES 0 2 4 6 FEET</p>	<p>"B" SCALE.  INCHES 0 2 4 FEET 6</p>



# ELECTRIC ERA



THE YEARS 1903 –1908 DEVELOPMENT OF SYSTEM

## CHAPTER ONE

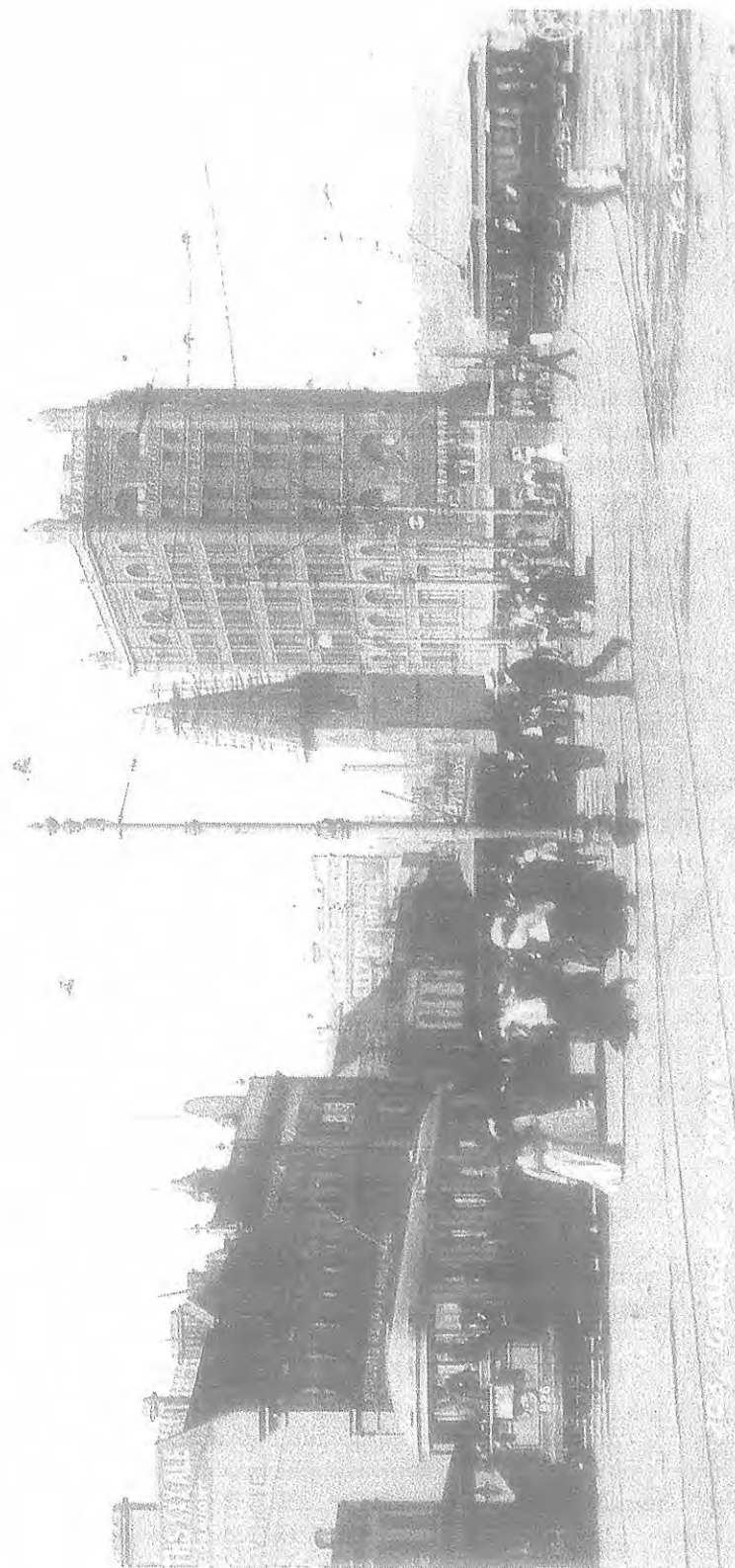
### THE YEARS 1903 TO 1908

Although some of the tramcars appearing in this book entered service as early as 1901 and as late as 1913, the bulk of the vehicles were sponsored by the 1903 to 1908 period . . . a time when the last cable and steam hauled services in Sydney were being converted to electric operation; when passenger loading was increasing throughout the State-wide New South Wales Government Tramway systems by an average of 10,000,000 per year; when the magnification of generating capacity at Ultimo Power Station, after a brief period of power starvation, enabled many electric route extensions to be made; when a brief trial in motor (steam) omnibus operation was conducted and discarded.

The first sixteen trams of the "N" class, cars 295 of 1901 and 398 to 412 of 1902, entered traffic at a time when most Sydney electric tramcars resembled United States' designs, while the fifty "K" type of 1913, numbered 1280 to 1329, were constructed, with reluctance, for the Bellevue Hill to Bondi Beach extension. The ordering of these fifty cars was not at all popular with Traffic Superintendent John Kneeshaw, who would have preferred additional 80 seat bogie "O" types for the route, but although a successful trial took place with these larger trams on the Bellevue Hill line on November 1st, 1910, Electrical Engineer, Orlando Brain, stood fast by the English Board of Trade emergency brake regulations for a further six years which necessitated in the re-ordering of the single truck "K" type vehicles, which by 1913, were considered an obsolete design.<sup>1</sup>

Under the successful triumvirate of John Kneeshaw as Traffic Superintendent, George Cowdery as Tramway (Permanent Way) Engineer and Orlando Brain as Electrical Engineer, the Sydney tramways changed from steam and cable operation, with a very small mileage of pioneer electric trackage, to a major electric traction undertaking in the short period of six years. In the period spanning the years 1903 to 1908, a design destined to become the standard Sydney type, a double ended, open or closed, cross bench car mounted on either a single or double truck, emerged.

The 254 trams discussed in this book made up the types known as the "H", "J", "K", "M" and "N" when alphabetical classification was given to passenger cars after March, 1911. These vehicles of this period, the last built to the restricted loading gauge caused by the narrow track centres of the King Street line and the centre bracket span poles in George Street, Sydney, can be summarised as follows:



"N" 626 with "F" and "C" type tramcars at Railway Square, 1905

*Kerry Photo, courtesy Tyrrell's Pty. Ltd.*

<i>Number</i>	<i>Class and Type</i>	<i>Date first in passenger service</i>	<i>Number in the group</i>	<i>Number in the class</i>
295	"N" 70 seat cross bench enclosed bogie car	8th June, 1901	1	
398-412	"N" 70 seat cross bench enclosed bogie car	16th August, 1902	15	
613-617	"N" 60 seat cross bench enclosed bogie car	26th March, 1903	5	
618-647	"N" 70 seat cross bench enclosed bogie car	10th December, 1904	30	
648-682	"J" 50 seat cross bench enclosed single truck car	12th November, 1904	35	
683	26 seat ex cable saloon single truck trailer number 25	1893	(1)	
684-728	"N" 70 seat cross bench enclosed bogie car	5th December, 1905	45	N = 96
729-736	20 seat ex cable saloon single truck trailer cars	1894	(8)	
737-738	"M" 70 seat cross bench open bogie car	6th November, 1906	2	M = 2
739-740	"H" 50 seat cross bench open single truck car	25th March, 1907	2	H = 2
741-745	"J" 50 seat cross bench enclosed single truck car	24th October, 1907	5	
(2nd) 23, 25, 38, 39, 98, 101, 110	"J" 50 seat cross bench enclosed single truck car	20th December, 1907	7	J = 47
746-802 (803-805)	"K" 50 seat cross bench open and closed single truck car	23rd March, 1908	57	
1280-1329	"K" 50 seat cross bench open and closed single truck car	23rd April, 1913	50	K = 107
Total electric cars — 254				

### Car Costs

The following lists give the cost of each tramcar dealt with in this volume.<sup>2</sup>

<i>Class</i>	<i>Number</i>	<i>Cost per car</i>
"H"	739-740	£805
"J"	648-682	£743
	741-745	£967
	23, 25, 38, 39, 38,	
	101, 110	?
"K"	746-802	£972
	1280-1287	£1,067
	1288-1308	£1,068
	1309-1329	£1,067
"M"	737-738	£1,084
"N"	295	£1,062
	398-412	£1,022
	613-647	£1,050
	684-728	£1,053
From Cable Trailers	683	£548
	734-736	£228

### Evidence of Expansion

The following statistics best illustrate the expansion of the New South Wales Government Tramways during the 1903 to 1908 period.<sup>3</sup> Although the rolling stock strength declined after 1905 and did not resume a steady increase again until 1909, the number of electric vehicles continued to show an increase during the period. The decline in gross numbers was brought about by a period of consolidation whereby the "loose ends" of the old Sydney steam system were finally electrified and the opportunity taken to sell or scrap obsolete steam, cable and electric rolling stock and to convert other items of passenger equipment to emergency service vehicles.

<i>Date</i>	<i>Route Miles</i>	<i>Steam Motors</i>	<i>Steam Trailers</i>	<i>Service Stock</i>	<i>Grip Cars</i>	<i>Cable Trailers</i>	<i>Electric Motors</i>	<i>Electric Trailers</i>	<i>Total</i>
June, 1903	124½	96	123	37	33	40	576	53	958
June, 1904	125½	92	76	39	33	40	575	51	906
June, 1905	125½	81	76	42	31	36	639	43	948
June, 1906	126	68	76	42	12	20	684	51	957*
June, 1907	129	60	76	43	—	2	681	46	908
June, 1908	132½	36	76	47	—	—	693	45	897

\*The June, 1906, total included 4 steam omnibuses



"N" 711 fitted with air brakes and "L" 142 in George Street, near King Street, 1910

*Photo, N.S.W. Govt. Printer*

A favourable balance of earnings in excess of working expenses continued during this period (although interest payments on capital costs were excluded from these calculations) and the return upon capital continued to be in the vicinity of  $3\frac{3}{4}\%$  per annum.

<i>Date</i>	<i>Surplus</i>	<i>Capital</i>	<i>Passengers Carried</i>	<i>Total Rolling Stock</i>
June, 1903	£97,869	£3,371,587	130,405,402	958
June, 1904	£129,360	£3,471,759	137,843,513	906
June, 1905	£127,887	£3,637,922	139,669,459	948
June, 1906	£186,400	£3,669,096	145,262,779	957
June, 1907	£180,754	£3,669,524	155,017,982	908
June, 1908	£202,929	£3,732,991	172,020,932	897

The following tables list details of new lines opened by electric cars between July, 1903, and February, 1909, as well as steam and cable conversions of that period. It was mainly for these expanded operations that the tramcars dealt with in the later pages entered service. During this time

additional routes, operated by steam, opened in Newcastle, Kogarah, Enfield, Broken Hill and Maitland, but these figures are beyond the scope of the following tables. All lines of the New South Wales Government Tramways were constructed to the standard 4'8½" gauge.

*New lines opened by electric services between  
July, 1903, and February, 1909*

<i>Opening Date</i>	<i>Location</i>	<i>Trackage when opened</i>	<i>Route Mileage (Miles Chains)</i>	
14/9/1903	Nicholson St. to Darling St. Wharf	Single		7
1/4/1904	Parramatta Rd. to St. John's Rd. via Ross St., Forest Lodge	Single		14
16/1/1905	Connecting Curves, Liverpool St. to Elizabeth St. towards Railway Square	Double		3
19/3/1905	King St. to Erskine St. via Day St.	Double		6
16/4/1905	Extension at Abbotsford Terminus	Single		5
30/7/1905	Elizabeth St. to Castlereagh St. via Hay St.	Single		5
18/2/1906	Elizabeth St. to Pitt St. via Bathurst St.	Single		9
18/2/1906	Elizabeth St. to Castlereagh St. via Liverpool St.	Single		5
7/4/1906	Lords Rd. Junction to Ascot Racecourse	Single		17
4/8/1906	Hay St. to Railway Stn. Colonnade and return	Single		36
8/9/1906	Sports Ground Loop	Double		40
20/11/1906	Ascot extension	Single		22
25/3/1907	Mitchell Rd. to Erskineville Per Way Yards	Single		32
30/9/1907	Cleveland St. to Ascot St. Third road along Bunnerong Rd., Kensington	Single		70
5/11/1907	New Coogee Loop via Arden and Dolphin Sts.	Double		7
6/11/1907	Bunnerong Rd. to Dowling St. Depot via Dacey Ave.	Single		35
15/1/1908	Zetland Terminus to Victoria Park Racecourse	Single		38
28/1/1908	Epping Junc., Forest Lodge. to Booth St., Annandale	Double		48
4/6/1908	Cooks River extension	Single		1
24/7/1908	Willoughby to Chatswood Station	Single		70
28/8/1908	Zetland Terminus to Dowling St. Depot	Single		64
24/12/1908	Rawson Place to George St.	Single		8
18/1/1909	Signal Station to Watsons Bay	Single		65
25/1/1909	Addison Rd. to Dulwich Hill	Double	2	2
25/1/1909	Railway Sq. to Erskineville	Double	2	14
1/2/1909	Elizabeth St. to Bellevue Hill	Double	3	57
26/2/1909	Bellevue Hill line to Oxford St. via Ocean St.	Double		14
Total — 15 miles 16 chains				



15/1/1905	King St. to Ocean St. Cable Tramway. (Partial electric operation since October, 1902)	Double
20/2/1905	Dacey Ave. to Kensington Racecourse	Single
16/4/1905	Leichhardt to Abbotsford	Single
19/6/1905	Kensington to Little Bay	Single
7/8/1905	Botany to La Perouse to Little Bay	Single
7/10/1905	Rifle Range Line	Single
1906	Long Bay Gaol Siding	Single

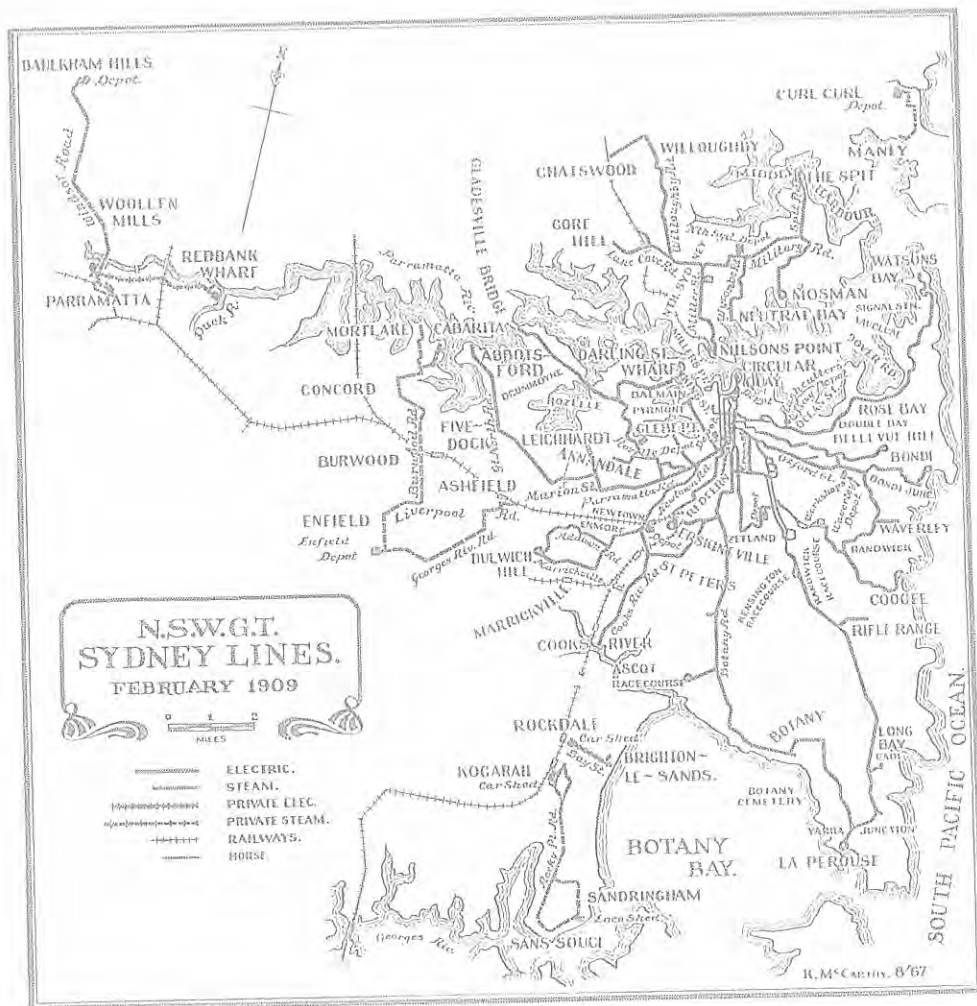
The abortive experiments with steam motor bus operation also belonged to this period. These buses operated along two routes; portion of one, connecting with the tramway at Darlinghurst, was serviced by trolley buses twenty nine years later, while the other at Enmore<sup>4</sup> was the site of a tramway extension a mere three years later.

*Steam omnibus trials<sup>5</sup>*

Operation Period	Location	Route	
		Miles	Chains
4/12/1905 to 7/4/1906	Darlinghurst to Potts Point	1	11
23/4/1906 to 29/5/1906	Enmore to Wardell Rd.	1	52

Details of other major works carried out for the electric network during the early period of electric operation:

1. Ridge Street Cable Tram Depot gradually extended for electric cars from 20/9/1893.
2. Rushcutters Bay Cable Tram Depot gradually extended for electric cars from 4/10/1898.
3. Ultimo Depot opened for electric cars and gradually extended 8/12/1899.
4. Fort Macquarie Depot opened for electric cars 10/8/1902.
5. Newtown Depot opened for electric cars 1/4/1900.
6. Waverley Depot opened for electric cars 7/9/1902.
7. Rozelle Depot opened for electric cars and gradually extended 17/4/1904.
8. Dowling Street Depot opened for steam rolling stock storage 27/5/1908, used by electric cars and extended 25/1/1909.
9. North Sydney Depot at Military Road opened for electric cars 3/6/1909.
10. Permanent Way Equipment Siding opened at Henderson Road, Erskineville 10/12/1906.
11. Connection between Loftus and Young Streets along Bent Street 30/3/1907.



### *Alphabetical Classification*

A standardised class lettering system for tramway rolling stock was gradually evolved from June, 1905, but was not officially introduced to electric passenger vehicles until March, 1911. It seems that the classification scheme was allocated to the cars in the order of their seating capacity and not with regard to the age of each class. Listed below is the alphabetical classification of cars in service prior to the introduction of the scheme, together with the former clumsy official description and the colloquial names used by the traffic staff.

<i>Old Official Description</i>	<i>Non-official Name</i>	<i>Seating</i>	<i>New Classification</i>
1", 10", 9" motors. (Based on cylinder diameters)	Steam motor	—	"A"
Steam trail car		60 or 70	"B"
Enclosed (electric) car	"Robbos"	26	"C"
Combination car	"Robbos"	34	"D"
Coupled 45 passenger car	"Jumping Jacks"	45	"E"
Bogie Combination car	"Californias"	48 (later 44)	"F"
St. Louis or Brill car		49	"G"
Tourist car		50	"H"
50 passenger enclosed	"Jumping Jacks"	50	"J"
50 passenger combination	"Jumping Jacks"	50	"K"
Cross seat bogie		55	"L" converted from "F"
Bogie tourist car		70	"M"
70 passenger car		70	"N"
80 passenger car	"Dreadnought"	80	"O"
Electric trailer cars		26	"T"
Service trucks		—	"S"
Ballast trucks, motors		—	"U"
Ballast trucks, trailers		—	"V"
Water sprinklers, motors		—	"W"
Water sprinklers, trailers		—	"X"

### *Generating Capacity*

From the moment a permanent electric tram line was established at North Sydney in 1893, until World War I caused a lull in tramway extensions, the Sydney electric tramway system was plagued with inadequate electrical generating capacity.

To power the three saloon tramcars available for the 1 mile 30 chains Waverley Extension Line electric trials inaugurated during November, 1890, the Thomson Houston Company of U.S.A. set up an Armington-Sims steam engine of 120 horse power at 300 revolutions per minute directly coupled to a Thomson Houston dynamo, which could develop 80 horse power at 500 volts, in the Randwick Tramway Workshops<sup>6</sup>. Although this apparatus was capable of working the cars, each of which carried two 10 h.p. motors propelling the wheels through double reduction gearing, some difficulty was experienced in maintaining the required 100 lbs. per square inch boiler pressure in the workshop's steam plant. The new electric traction system proved too extravagant at this juncture to be adopted on a large scale in New South Wales. Not only was the colony in the throes of a severe financial depression, but the working expenses of the electric line amounted to 16.46d. per mile for the seventeen months' trial period compared with an average cost of 13.68d. per mile for steam operation during that decade.

The Randwick generator and electric cars were transferred to the Ridge Street cable depot at North Sydney to work the new electric tramway extension of 2 miles 5 chains between the cable tram line at St. Leonards Park and Spit Road, opened on September 20th, 1893. This time the Thomson Houston dynamo was coupled to a 50 horse power Westinghouse

high pressure steam engine originally imported from the U.S.A. by Messrs. Kingsbury and Company<sup>7</sup>. To assist this 500 volt generating gear at times of heavy loading an accumulator house was constructed at Spit Road capable of providing a current at 60 to 70 amps from a battery of 220 sheet lead cells. Mr. P. Elwell, head of the Electrical Engineering Branch of the New South Wales Government Railway was responsible for this North Sydney installation.

For this North Sydney venture two of the Randwick-Waverley tramcars each received two 27 horse power motors while two 30 horse power units powered the third vehicle. This must have caused a strain on the Ridge Street dynamo for on September 2nd, 1894, the Thomson Houston machine "burnt out" bringing the pioneer electric service to a halt. Until a temporary generator could be brought into use on Saturday, September 9th, the line carried on with cable trailer cars hauled by horses<sup>8</sup>. Even after this date the new generating machine's limited capacity could only supply enough power to work one electric car so at periods of heavy traffic additional accommodation had to be provided by the horse cars.

This relief, however, was short lived as the "small dynamo" failed on Monday evening, September 17th and not until Saturday, September 29th, could full electric service be re-established using the original dynamo re-wound by Messrs. E. Yates and Company.

Extensions to the Ridge Street generating station enabled further expansion of the electric lines to Mosman Wharf in March, 1897, and Willoughby in April, 1898. To this end additional battery houses appeared on the North Sydney system, at Flat Rock on the Willoughby line and at Mosman. During 1898 the local councils requested that the tramways provide power to illuminate the streets of Willoughby and Mosman, but Commissioner C. Oliver was forced to reject this request as the current generated at Ridge Street was barely adequate for the needs of the tramway, but he promised that the suggestion would receive further consideration when the Ultimo Powerhouse in Sydney was opened and connected to the North Shore by submarine cable.

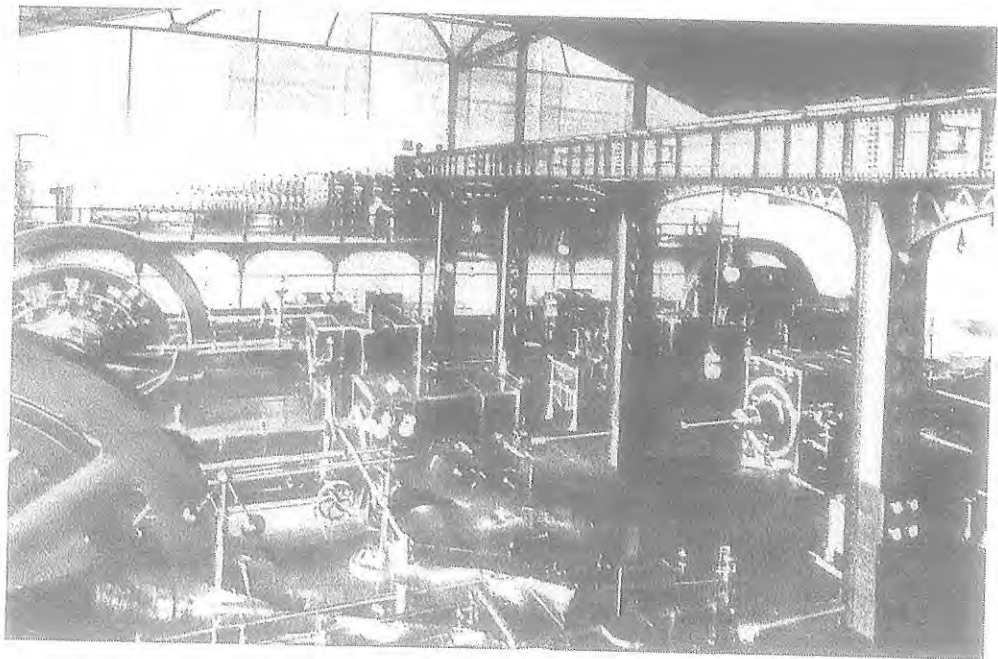
Another small generating station was established in the cable winding house at Rushcutters Bay Depot to work the new electric line opened on October 4th, 1898, beyond the Ocean Street cable terminus to Rose Bay on the southern shore of Sydney Harbour<sup>9</sup>. Two General Electric multi-polar compound dynamos, capable of producing a current of 272 amps at 500 volts, were set up under the supervision of the Public Works Department while in an adjacent room at the depot a battery of 245 accumulators rated at 72 amps assisted operation at peak periods and could also furnish enough power to work the Double Bay sewerage pumping station.

To provide additional power for the electric extension beyond the Rose Bay terminus to Dover Road opened on September 10th, 1900, a positive feeder cable was erected from Ultimo power station, while the cable tram tracks to the City were electrically bonded from George Street to Ocean Street to provide a negative return. This solution enabled the

extension of the small inefficient Rushcutters Bay generating plant to be avoided and current to be drawn from Ultimo during Saturday and Sunday periods of heavy traffic. This arrangement was first used on Sunday, August 19th, 1900<sup>10</sup> to good effect when the cable winding machinery at Rushcutters Bay closed down for alterations and the boilers, which would have been kept in service to provide steam for the electric sets, were able to be shut down.

#### *Direct Current Generation at Ultimo*

The opening of the George Street electric tramway in Sydney, the nucleus of an electrification scheme aimed at removing all steam trams from the main system, had been planned for September, 1899 (and to this day many official records state that the opening took place on the 8th of that month) but owing to seemingly unending delays, which caused much heated debating in State Parliament, the line did not open until Friday, December 8th, 1899<sup>11</sup>. These delays were due to several considerations: During construction the line was extended beyond the originally planned terminal and the capacity of the generating units in the new Ultimo power house was raised from 800 to 850 K.W. This equipment was apparently installed before the completion of the roof of the station and several days of inclement weather thoroughly saturated the dynamos. A test conducted on generator and engine Number 2 caused trouble when the crank pin



The original engine room at Ultimo Power Station showing the horizontal Reynold-Corliss steam engines working General Electric multi-polar generators, 1899

*Photo, Dept. of Railways, N.S.W.*



bearing overheated, but after some adjustments the machinery ran with satisfaction during the second trial of Monday, November 20th, 1899. The following day set Number 1 ran efficiently during trials but sets 3 and 4 could not be tried at this juncture as there was still evidence of some dampness.

These Ultimo generators could each provide current of 550 volts at 1,545 amps with 20% less heating than was permissible, while a check on the overhead wiring during late November, 1899, carried out by transmitting 2,500 volts through the trolley wire instead of the then usual 550 volts proved that the installation was ready for traffic trials.

The original engine room at Ultimo power house was contained in a section 147 feet by 105 feet divided into two bays over which two travelling cranes each capable of lifting 30 tons were provided. In each bay two sets (a total of four) of right and left hand horizontal cross compound Reynold-Corliss type steam engines manufactured by E. P. Allis and Company of U.S.A. (Allis Chalmers) were each directly coupled to General Electric multi-polar, compound wound generators each rated at 850 K.W. or 1,100 horse power at 550 volts with a maximum overload of 50%.

Each steam engine unit consisted of one high pressure 26 inch diameter cylinder and one low pressure one of 48 inch diameter working at 100 revolutions per minute and capable of developing 1,250 horse power. Each engine carried two governors, one, of the special weighted high speed type driven by eccentrics from the main shaft, was regulated to automatically shut off the steam if the engine exceeded the normal speed by 5 revolutions per minute. The other governor was belt driven and regulated the engine speed within 2% of normal operation. The condensers were of the Wheeler surface type with "Blake" direct acting air pumps, the steam being derived either directly from the water mains or through the jacket of the receiver.

There were two complete systems of feed mains, one for hot and one for cold water. The feed pumps in the 86 feet by 47 feet pump room consisted of two triplex plunger pumps capable of delivering 125 gallons per minute against a steam pressure of 140 lbs. per square inch. Each pump was driven by means of a 25 horse power electric motor. The condensing water supply circulated from Darling Harbour through a conduit 1,000 feet long and 3 feet 3 inches in diameter. The hot well was located near the feed pumps and the water discharged from the pumps through a "Reeves" filter before entering the boilers.

The power house boilers, of Babcock and Wilcox manufacture, stood in a room 105 feet by 86 feet and were arranged in two batteries of seven, each boiler being capable of generating 300 horse power at a pressure of 140 lbs. per square inch. During the initial stages of production only two boilers were mechanically coal fired, the others were converted later. The main flues passed through the pump room to a chimney stack 200 feet high with a minimum diameter of 6 feet. Twelve of the boilers were sufficient at this stage to work the station at full capacity, thus two were kept in reserve.

Power for lighting and testing purposes was derived from two batteries each of 300 cells mounted on wooden stands to facilitate cleaning and inspection.

A tramcar made the first trial trip over the new George Street line on Wednesday, November 22nd, 1899, and on Monday, 27th, Members of the Colonial State Parliament sampled this new utility. Trouble from overhead point frogs at complicated junctions prevented the opening of the line taking place until the morning of Friday, December 8th, 1899, when at 5-20 a.m. the first car in regular passenger service left Pyrmont for the City. During the previous day forty-one electric trams had worked over the line to enable as many drivers as possible to "learn the road" and many people took this opportunity to have a free ride at their "own risk".

Although the New South Wales Government Tramways had been operating electric services for almost ten years the Ultimo scheme was not free from initial troubles. At 8-45 p.m. on Thursday, September 12th, 1901, all electric trams came to a standstill when a fire, believed to have started in rubbish behind the main slate switchboard, burnt for twenty minutes, causing damage to the main slate switchboard and burning a hole in the roof and through the floor to the cable room beneath<sup>12</sup>. Fortunately, the quick action of the power house staff in throwing tarpaulins over the engines and dynamos protected them from damage by water and fire.

Earlier that evening Traffic Superintendent Kneeshaw had left Sydney on the Melbourne Express bound for Broken Hill by way of Adelaide to inspect the route of the Broken Hill steam tramway and to discuss proposed fares and services with the Town Council. An urgent telegraphic communication intercepted the express train at Moss Vale and a frantic return dash to Sydney on a special light locomotive enabled Mr. Kneeshaw to have a horse bus service organised between Circular Quay and Railway Square and an emergency steam tram service to more distant electric termini by the next morning.

Although Electrical Engineer Brain was on vacation in Brisbane and was unable to reach Sydney until Saturday, his staff were able to restore a limited electric tram service by 6 p.m. on Friday evening using a temporary switchboard and cables.

#### *Installation of Alternating Current Machines*

As the Sydney tramway electrification scheme progressed the original Ultimo steam engines rated at 1,250 horse power were regularly worked at a higher loading of 1,600 horse power each. During June, 1902, the first of three vertical cross compound, Allis Reynold (Allis-Chalmers Company manufacture) reciprocating steam engines, each coupled directly to a General Electric alternator, entered production in a new engine room of 176 feet by 99 feet built at the southern end of the original direct current generating unit<sup>13</sup>. These vertical 2,500 horse power condensing engines each had one 32 inch diameter high pressure cylinder and a single 64 inch diameter low pressure one working on a 60 inch stroke at 75 revolutions per minute. The General Electric 1,500 K.W., 6,600 volt 3 phase generators were



located between each pair of cylinders and consisted of stationary armatures with 40 field poles attached to the periphery of the 280 inch diameter fly wheel. This fly wheel rotated at 75 revolutions per minute to produce alternating current at 25 cycles per second.

Foundations were provided for a further three similar reciprocating engines in the new machinery room, but in the short space of two years, when the generating capacity of Ultimo had to be expanded again, the steam turbine had reached a stage of efficient development to cause plans for the commissioning of any further reciprocating machines to be abandoned.

To provide steam for this new unit and the other two engines placed in service soon afterwards, 24 Babcock and Wilcox water tube boilers arranged in two tiers, and each with a nominal horse power capacity of 250 at 160 lbs. per square inch pressure, were installed in a new 176 feet by 84 feet boiler room located at the southern end of the original structure.

There is some confusion as to the total number of boilers available at Ultimo at the close of 1902. Contemporary reports clearly state that 14 boilers were installed in 1899, while 24 units followed in the 1902 expansion programme, but reports of the period are adamant that a total of 32 boilers then made up the full complement at Ultimo. It is possible that six of the original 1899 number may have been removed during the 1902 magnification activities.

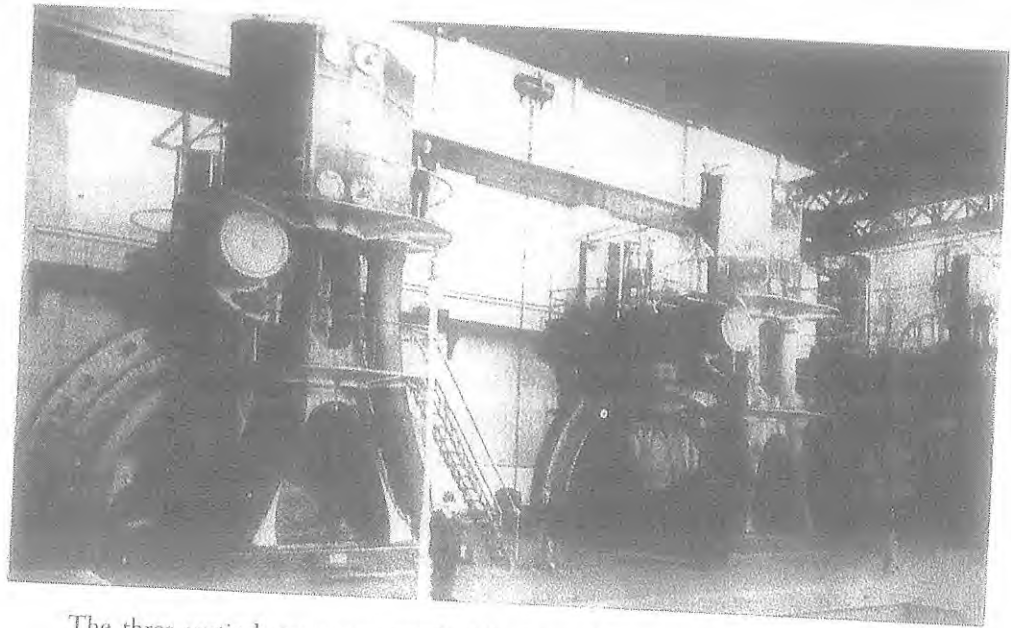
The installation of the three alternating current units enabled sub stations to appear around the Sydney tramway system. The City sub station, located on the site of the present Public Library, was typical of these early units. Two separate buildings, one 50 feet by 30 feet by 17 feet high housed the transformers, converters and switch gear while the battery house measured 50 feet by 40 feet by 10 feet.

The battery house sections of several of these sub stations were pressed into service as booster units to the direct current system prior to the reticulation of alternating current. The battery section of Ridge Street sub station at North Sydney commenced operation during early 1901 while the booster unit and battery house at Newtown followed at the close of May, 1901. Two months later portion of the City station was commissioned for similar service.

The following table gives some details of these early electricity sub stations<sup>14</sup>.

<i>Name</i>	<i>Location</i>	<i>Number of Units</i>
City	Macquarie St.	2
Bondi	Corner Oxford and Ocean Sts.	2
Randwick	Randwick Workshops	1
Newtown	Newtown Depot	2
North Sydney	Ridge St.	2

Each station "unit" at this period consisted of three 175 K.W. capacity transformers to break down the high tension 6,600 volt alternating current



The three vertical, cross compound, Allis Reynold reciprocating steam engines coupled with General Electric alternators installed at Ultimo Power Station during 1902

*Photo, "Street Railway Review"*

to 375 volts (3 phase) which energised a rotary converter of 450 K.W. with a two hour rating of 800 horse power. One battery of accumulators with a maximum discharge of 600 K.W. and a 100 K.W. battery booster unit completed the picture.

These sub stations listed above commenced their intended operation of converting high voltage alternating power to the lower 600 volt direct current traction current between July and November, 1902, soon after the commissioning of the alternating power plant at Ultimo.

During the twelve months period prior to the generation of alternating current at Ultimo, the direct current equipment produced 12,953,084 K.W.H. Two years later the annual production, with four direct current and three alternating current generators in operation, amounted to 14,685,324 K.W.H. of D.C. and 19,054,953 K.W.H. of A.C. transmitted to the Sydney tramway system. This total of 33,740,277 K.W.H. was increased to 89,113,036 K.W.H. just eight years later, a fact which amply illustrates the fantastic growth of the Sydney electric tramway undertaking during this period.

#### *Installation of a Parsons Turbo-alternator*

To provide power for further conversions of the remaining steam tramways and the Ocean Street cable route, new generating plant costing £50,000 consisting of a Parsons 3,000 horse power turbine, working at 1,500 revolutions per minute, coupled to an alternator rated at 1,875 K.W. was ordered for the Ultimo power house. This new generating equipment required an additional 16 Babcock and Wilcox water tube boilers and entered production on a 90 day trial period on January 9th, 1905,<sup>15</sup> making Ultimo the largest generating station in the southern hemisphere with a total capacity of 17,800 horse power.



CROSS SECTION THROUGH ENGINE AND BOILER ROOM OF ULTIMO EXTENSION POWER HOUSE

The 1902 extensions to Ultimo Power Station  
Diagram, "Street Railway Journal"

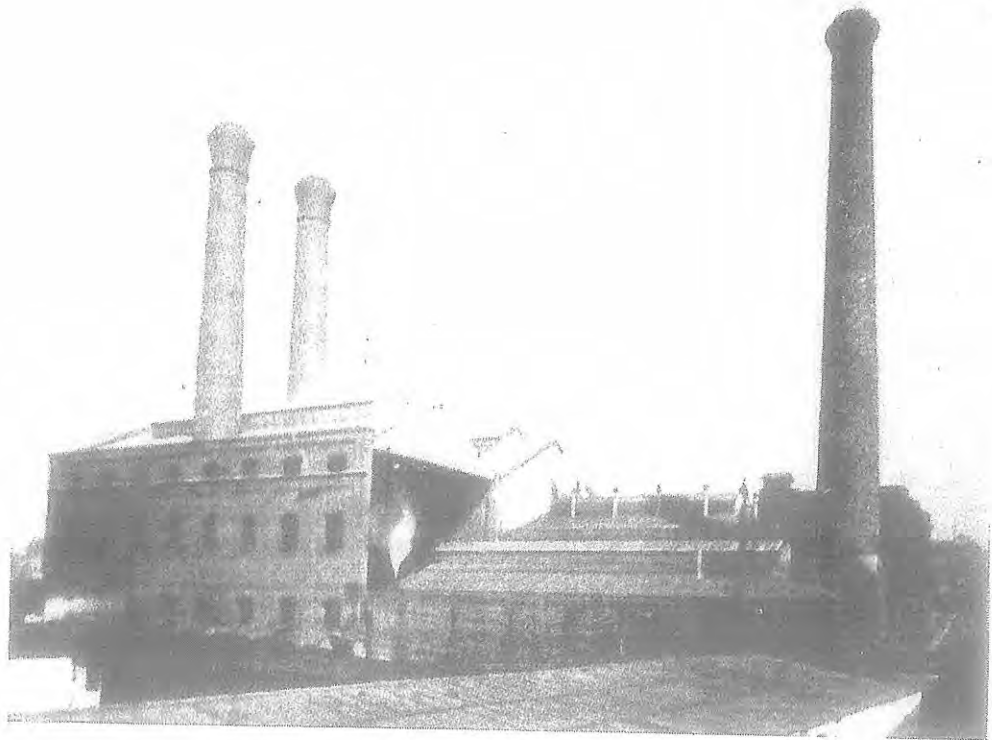
#### *Two Additional Turbo-alternators*

During 1905 the generating capacity of Ultimo was such to enable one alternating current and one direct current unit to remain out of service, even at peak periods, but by early 1907 the demand had again outstripped the supply thus forcing the Railway Commissioners to further extend the Ultimo station. These Commissioners reached the decision on May 21st, 1907, to place an order for a 5,000 K.W. turbo-alternator with an overload capacity of 7,500 K.W. or 10,000 horse power with Messrs. Parsons of Newcastle-upon-Tyne at a cost of £50,000<sup>16</sup>. Three days later the "Evening News" reported that the order had been duplicated and two sets of equipment would soon be delivered to work not only the increased traffic on existing services, but to provide sufficient power for the new Addison Road, Erskineville, and Bellevue Hill tramways.

After a delay of six months, due to an industrial strike in England, a ship wreck, and a faulty steam pipe found to be fractured on delivery, the first machine arrived on the S.S. "Port Chalmers" on November 20th, 1908, and by the close of the month was partially erected, a feat assisted by the fact that machine beds and auxiliary plant had been prepared ready to receive the new plant for some time. At this juncture a total of 32 boilers worked each day at Ultimo out of a total of 48; the power consumption of the 625 tramcars in regular service (each with motors of 100 to 120 horse power capacity per car) was calculated as requiring a powerhouse capacity of only 24 horse power per vehicle.

... covers the growth of generating capacity for the period in which the rolling stock treated in this book, and Volume I, entered service. The expansion of Ultimo power house continued for another five years, but after 1913, a temporary 7,500 K.W. steam turbine unit commissioned at White Bay marked the end of further major expansion at the Ultimo plant.

The table in Appendix "A" illustrates the major changes at Ultimo power house between 1902 and 1916.



Ultimo Power Station showing the original 1899 section at the right and the incomplete 1902 extensions at the left

*Photo, "Street Railway Journal"*

<i>Commissioning Date</i>	<i>New Generating Equipment</i>	<i>Removal of Old Equipment</i>
8/12/1899	4 x G.E. 850 K.W. 550 volt D.C.	
1/6/1902	3 x G.E. 1,500 K.W. 6,600 volt A.C.	
9/1/1905	1 x Parsons turbo-alternator 1,875 K.W. A.C.	
8/1/1909	1 x Parson turbo-alternator 5,000 K.W. A.C.	
6/9/1909	1 x ditto	
15/10/1911	1 x ditto	
25/12/1912	1 x 7,500 K.W. ditto	No. 5 & 7 vertical generator-engines of 1902
3/10/1913	1 x 5,000 K.W. ditto	No. 9 vertical generator-engine of 1902
8/12/1914	1 x 7,000 K.W. ditto	1 x G.E. 850 K.W. D.C. generator of 1899
By 6/1916		

The patchwork growth of the generating units at Ultimo reflects the rapid progress being made at the turn of the century in the field of electricity generation. The fact that Ultimo received its first turbo-alternator only two years after the first such installation was made in the U.S.A. for traction purposes in the Elyria power house of the Cleveland and South-western Traction Company,<sup>17</sup> best illustrates the desire of the New South Wales Government Tramways to have nothing but the latest and most efficient designs in generating machinery.

Unfortunately not all people considered the Ultimo plant to be a progressive establishment<sup>18</sup>. Mr. F. Bradford, the designing engineer, and later manager, of the 5 mile 10 chain, St. Kilda to Brighton tramway then under construction in Victoria, expressed the view before the Railway Standing Committee in Melbourne during October, 1905, that the Ultimo powerhouse was grossly inefficient . . .

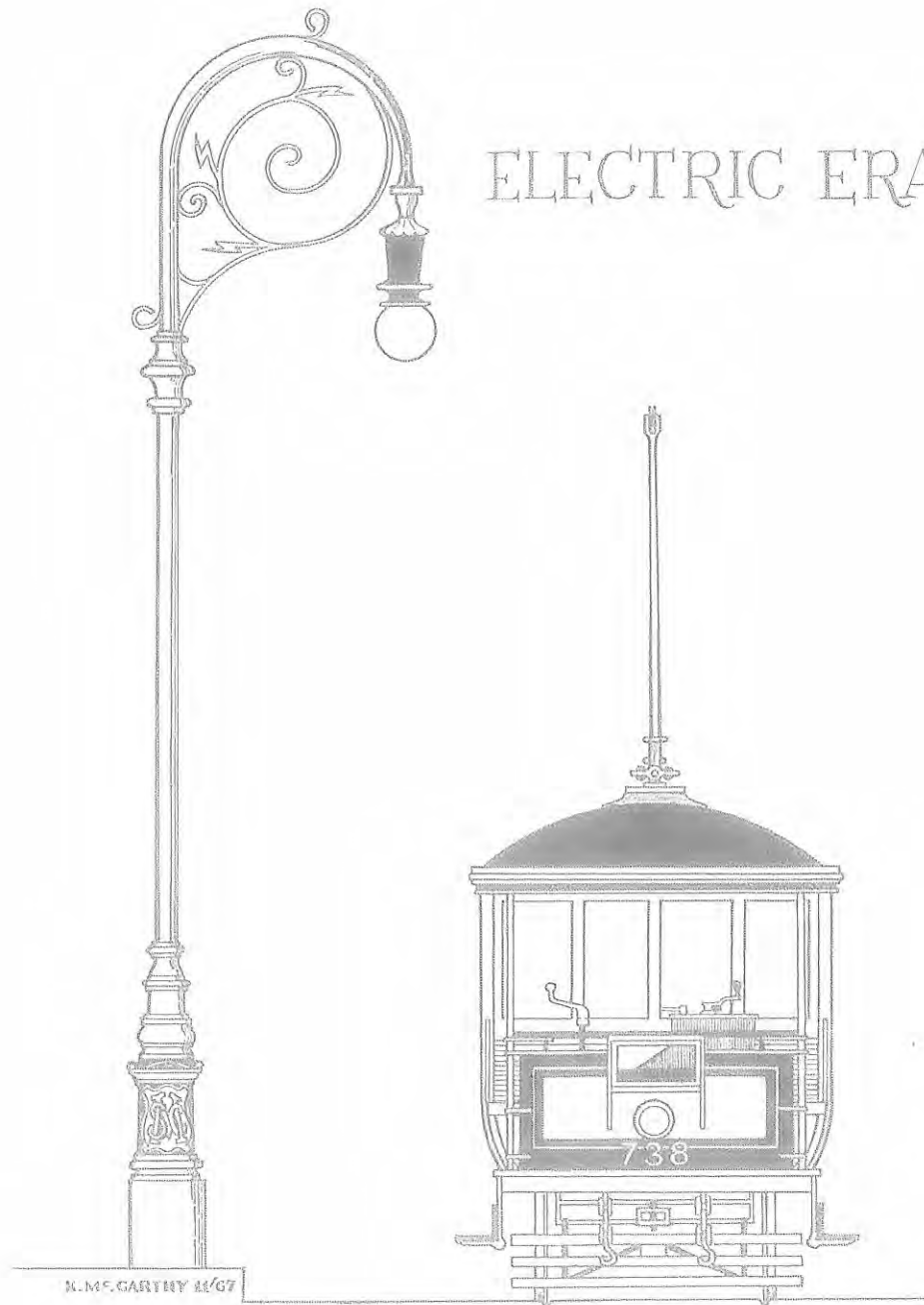
# NOTES

1. "Government Transport Archives" — Archives Office of New South Wales. Letter from Traffic Superintendent John Kneeshaw to Tramway Engineer George Cowdery, dated July 14th, 1910, stated that he was adverse to having more four wheeled rolling stock built and enquired whether the track on the Bellevue Hill Line would be satisfactory for "O" type bogie cars.
2. On February 14th, 1966, Australian currency changed from pounds, shillings and pence to dollars and cents. The conversion rate in 1966 was £A1 = \$A2; this however, has little comparative bearing on costs for the 1903 to 1908 period. Between 1822 and 1828 the dollar was the official currency in the colony of New South Wales, but a reversion to sterling was enforced by the British Government.
3. N.S.W. Railway and Tramway Commissioners. "Reports for 1903 to 1908", N.S.W. Government Printer.
4. See R. Willson, D. Keenan, R. Henderson. "The Green Lines", p.20.
5. A letter from Assistant Superintendent E. Doran to Traffic Superintendent J. Kneeshaw dated July 26th, 1905, in the "Government Transport Archives", "Carrington Line", reveals that plans existed to operate the Sydney steam buses between Newcastle Railway Station to Carrington along the route of the then partially laid tramway.
6. See (a) R. Willson, "Sydney's First Electric Tramway", "Electric Traction", November, 1965, p.10.  
(b) K. McCarthy, "Enter the Electrics", "Electric Traction", March, 1961, p.10.  
(c) C. R. G. Field, "Sydney's First Electric Tramway", "Electric Traction", November, 1953, p.2.
7. "The Sydney Morning Herald", September 8th, 1893, p.4. September 13th, 1893, p.7, September 21st, 1893, p.3.
8. "The Sydney Morning Herald", September 11th, 1894, p.11. September 19th, 1894, p.4, September 28th, 1894, p.4.
9. See (a) "The Town and Country Journal", October 8th, 1898, p.37.  
(b) "The Sydney Morning Herald", March 12th, 1898.
10. "Australian Mining Standard", August 23rd, 1900, p.189.
11. "The Sydney Morning Herald", November 22nd, 1899, November 23rd, 1899, December 1st, 1899, December 9th, 1899.
12. "Australian Mining Standard", September 19th, 1901, p.424.
13. See (a) "The Electric Railway in Sydney", "Street Railway Review", December, 1902, p.610.  
(b) "The Tramways of Sydney, N.S.W.", "Street Railway Journal", September 20th, 1903, p.745.
14. "The Sydney Morning Herald", June 11th, 1901, p.3.
15. "The Evening News", January 13th, 1905.
16. "The Evening News", May 21st, 1907, May 24th, 1907, November 20th, 1908.
17. See H. Christiansen, "Northern Ohio's Interurbans", p.70.
18. "Railway and Tramway Review", November 6th, 1905, p.9. For an account of Mr. Bradford's dismissal from the post of manager of the St. Kilda to Brighton Tramway see "Annett Lock", "An Australian Traction Pioneer", "Railways in Australia", June, 1950, p.13.



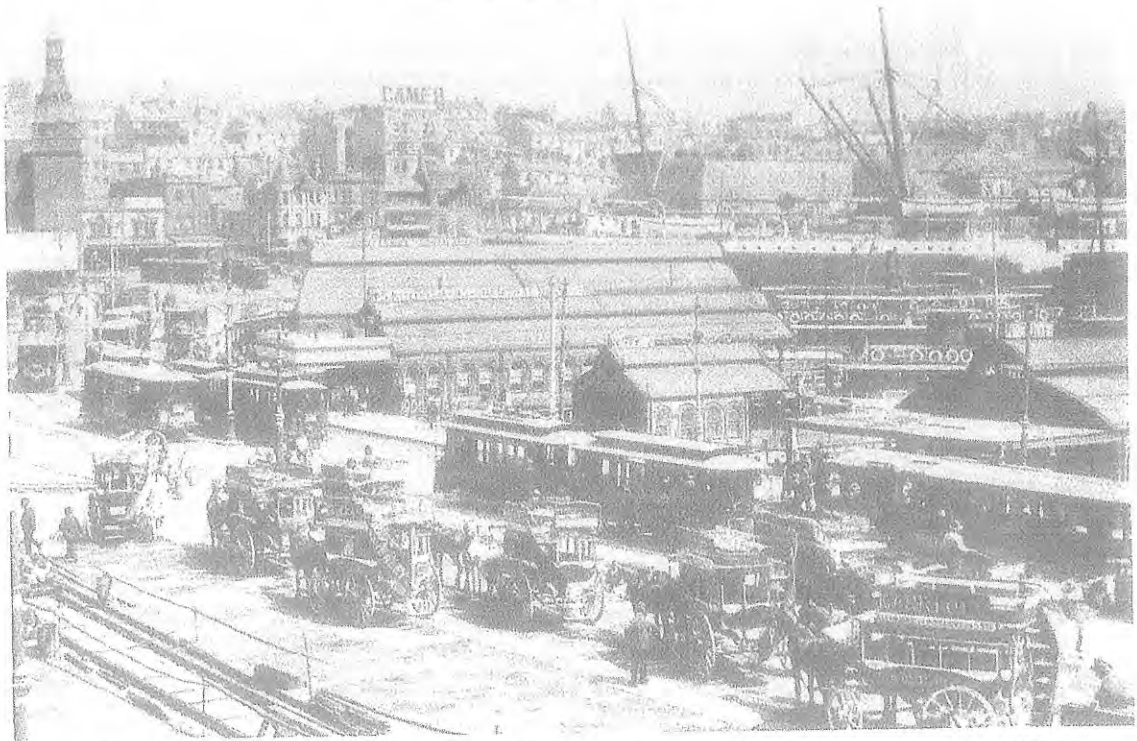


# ELECTRIC ERA





## INTRODUCTION



Circular Quay with C and F class trams and double deck horse buses in 1899.

The N.S.W. Government Tramway system was amongst the large networks of the world and for its entire operating period, functioned as a Department of the N.S.W. Colonial, and later, State Government. Over the one hundred year period between 1861 and 1961 the operating authority existed under the following names:- Tramway Section of the N.S.W. Government Railways, N.S.W. Government Tramways, Metropolitan and Newcastle Transport Trust, Department of Road Transport and Tramways, Department of Government Tram and Omnibus Services and Department of Government Transport. The name by which the network was best known was the New South Wales Government Tramways (N.S.W.G.T.) the reference which is used in this book.

Street tramways arrived early in Sydney when a single track, horse worked, line was constructed for the N.S.W.G.R. along Pitt Street, linking the Redfern railway terminus with Circular Quay. This line was constructed to the specifications of George Francis Train, an American entrepreneur, who had spent some time in Australia and was then currently introducing this form of street transport to urban areas in America, England and Europe. This tramway operated from 1861 until 1866 by a private contractor for the N.S.W.G.R., the service being closed due to the objections of the Pitt Street business people. Their main grievance was prompted by the nature of the track which caused the carriage trade to avoid that thoroughfare. Step rails were ordered for the undertaking which suited small profile tramway wheels but as the tramway doubled as a goods railway connection to the harbourside at Circular Quay these rails were laid with the steps outwards to enable the coarse profile wheels of the railway wagons to ride on their treads rather than on their flanges. The sharp edge of the rail step projected outwards while the rails were partially above the adjacent road surface.

Street tramways appeared again in Sydney in September 1879 as a temporary measure linking the Redfern terminal with Hunter Street, this time along Elizabeth Street to serve the International Exhibition. Planned to use steam traction from the start the first twelve days of operation employed horse traction due to the late arrival of the rolling stock from U.S.A. The railway authorities and politicians saw in this steam tramway a cheap, but satisfactory method of serving the expanding eastern suburbs of Sydney in comparison with the planned railway for that area so the temporary tramway became permanent and soon extended to most Sydney suburbs as well as several country and provincial centres in the state.

The first permanent electric tramway opened in North Sydney as an extension to the local cable line in 1893 after experiments had been conducted in accumulator cars (1888 and 1894), compressed air\* (1890) and conventional electric traction at Waverley (1890). A second outer suburban electric tramway feeding into the King Street cable route at Ocean Street commenced in 1898 while the general electric conversion from steam and cable traction was launched in 1899 with the opening of the George Street tramway, and by 1908 electric traction reigned supreme on the main Sydney and North Sydney networks.

In the pre-electric period, the N.S.W.G.T. employed steam and cable traction while horse working was limited to short periods, at St. Peters and Manly, on steam lines where patronage was not up to expectation. Two horses hauling two cable tram trailers, came to the rescue in September 1894 during a generator breakdown on the infant electric system at North Sydney, but otherwise the N.S.W. undertaking persevered successfully with mechanical traction from 1879. So successful was the tramway network in its heyday that between the 1910's and the 1940's a million passengers were carried each day in the main Sydney urban area, this amounting to one journey each day for each man, woman and child!

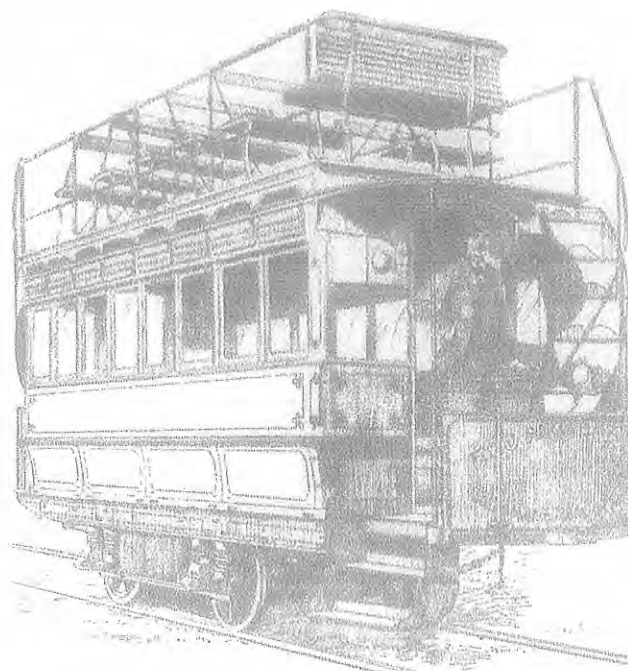
This vast volume of business called for many unusual features in a city famed for its harbour and deep water inlets with steeply graded shores and the vast suburban sprawl. Some of the features which come to mind were:-

1. The ferry transfer of cars between the North Sydney and Manly routes.
2. The long sea and rail trip via South Australia needed for the transfer of rolling stock between Sydney and Broken Hill.
3. The counterweight trolley system needed to steady trams down and up the Darling Street hill at Balmain.
4. Opening bridges across harbour inlets.
5. The complex terminal arrangements at Randwick Racecourse which were larger in size than most railway station facilities with the exception of state capital terminals.
6. The transfer of rolling stock between the isolated tramway segments whereby steam and electric cars were hauled by steam motors over miles of railway track on Sunday mornings. This was later replaced by a tramcar carrying road trailer known as *The Lizard* onto which a tram could be driven under its own power.
7. The many 'cross country' services which joined major suburban tramway terminals, linked railway stations with the hinterland, or joined urban areas with the adjacent ferry wharves.
8. The advance, hailed in penology, when the prison tram was introduced; enabling miscreants to be transported from Darlinghurst Courts to Long Bay Gaol between enclosed terminals sheltered from the curious public gaze.
9. Major manufacturing techniques pioneered at Randwick Workshops, such as electric welding processes - the subject of articles in learned technical journals.
10. The hearse car service in Newcastle for the bereaved, which enabled many families, even the poor, to provide a respectable interment service for the departed members of their families.
11. Grade separation of tracks where one line crossed the other by bridges.

Only four private tramways of note functioned in N.S.W. with a fifth, partially constructed by a land boom firm in the 1890's beyond the North Sydney cable terminus to the Suspension Bridge area, becoming a victim of the financial depression of that era. Thomas Saywell, the proprietor of the tramway between Rockdale and Brighton-le-Sands, as well as associated property in that district, started steam operation in 1885 and then worked the undertaking with electric vehicles on the "three wire" system between 1900 and 1914 when the N.S.W.G.T. took over the enterprise and converted it to the conventional standards. Saywell also shared interests in a similar venture linking Fassifern station with the lake side resort of Toronto in the Newcastle district. This line functioned with light railway equipment between 1891 and 1910, using steam power during the propitious

(Footnote: \* Mention made of this in 1880 and 1890, but no conclusive data is to hand.)

Battery-electric tramcar (Julien's Accumulator System) as tried in Sydney in 1888, without success.



periods and horse traction at other times. The N.S.W.G.T. operated this line with conventional steam tram rolling stock during 1910 and 1911 while the undertaking was converted to railway standards.

The third private tramway was essentially steam worked by local ferry companies and linked the Redbank Wharf with Parramatta Park. The N.S.W.G.T. never resumed operation on this tramway during its entire life, which spanned the period from 1883 to 1943. The fourth public carrier was unusual in that it employed a petrol loco and linked the new Byron Bay jetty with Byron Bay railway station. Built at a time when the far northern rivers district of N.S.W. lacked a direct rail connection with Sydney, the loco hauled two tramway trailers, both former N.S.W.G.T. cars, between 1924 and 1941 with the last charter passenger run being made in 1961, to meet all passenger steamers to and from the south. Goods operation commenced in 1923 and has continued to date on this private line.

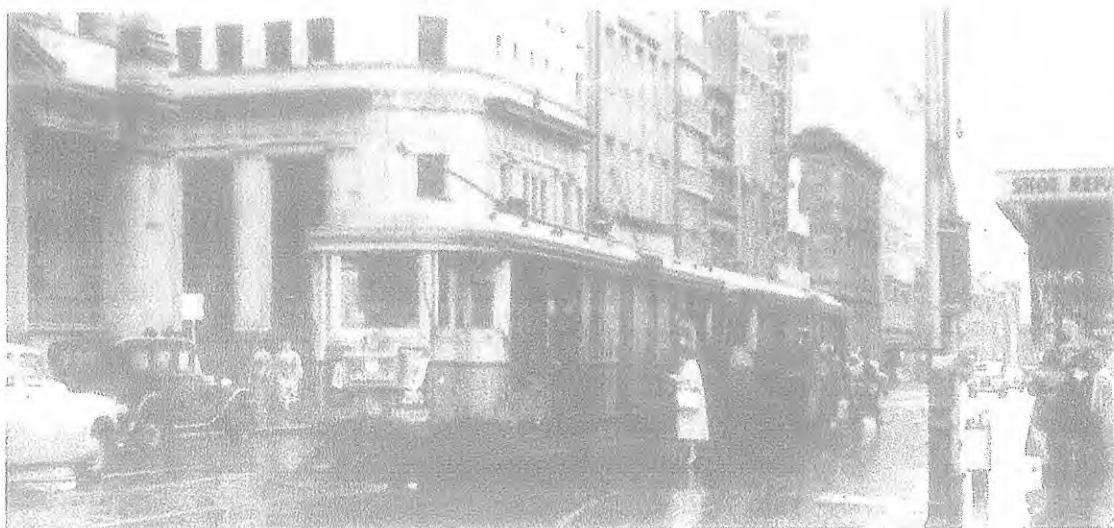
Essentially a passenger carrying operation, the N.S.W.G.T. owned a considerable fleet of non passenger vehicles known as 'Service Stock'. These trams were mainly employed in breakdown work, track maintenance tasks and overhead adjustments, although from time to time limited freight haulage was conducted, both on a departmental and a private basis. These special units were either built new or created by conversion of passenger rolling stock. The first service stock item (1SV) was constructed in 1882 and the last in 1956 (144S).

After the general electrification of the Sydney system some 43 steam tram trailers received air operated braking equipment by 1908 for limited use behind electric trams, but the expansion of the steam services in the country and provincial centres coupled with the deferment of the Newcastle electrification caused all these to return to steam service by 1911 and by 1916, nine N type electric cars were demotored for steam service, although only six were eventually transferred to Newcastle. The situation again reversed with the electrification of the large undertaking at Newcastle and 20 steam trailers were again modified for electric haulage between 1926 and 1935.

Tramway expansion lost momentum after World War I due partially to private bus competition and the uncertain economic climate of the western world of that period. Steam lines not electrified were closed between 1926 and 1937 with the private Parramatta route lingering until 1943. Electric closures initiated with minor branches in 1933 and seemed to gain momentum in 1938-9 with the demise of two Newcastle services and the Manly system, but this trend halted in 1940 after the Erskineville bus conversion, due to World War II restrictions; in fact the Suspension Bridge line was forced to reopen due to wartime fuel shortages.

Between December 1905 and May 1906 the N.S.W.G.T. conducted trials with four steam buses on two routes, but these operations proved economic failures





O cars loading in George Street at the Hunter Street stop.

and the Government remained out of the bus business until 1932 when the first run of what was soon to become a large bus enterprise in Sydney was launched in December, to be followed in September 1935 with the launching of a government route in Newcastle. Between January 1934 and April 1948 a successful but awkward trolley bus route worked between the City and Potts Point via King's Cross in Sydney while a larger network replaced the steam trams at Kogarah in July 1937. The trolley bus was seen as the vehicle *par excellence* of the 1930's and would replace the trams in time, but the conversion of the Kogarah trolley buses to diesel bus operation in August 1959 meant that the trams lasted longer than the mode once considered their superiors!

Tram scrapping resumed again in 1948 with the Suspension Bridge and the Mayfield branch conversions and the closure of the isolated Enfield lines. Although other sections followed, it seemed by 1952 that a smaller but compact tramway system would be retained for the time being in Sydney largely served by the corridor trams, 250 of which were then being progressively delivered. This possibility was dismissed in 1953 when tramway closures resumed and the remaining 150 undelivered cars of the current order were cancelled. The timetable which culminated in the final closure on 25th February 1961 commenced in 1957 when whole tramway regions on the main system were progressively converted to bus operation, the last physically isolated network independent of the Sydney city lines, that at North Sydney, ceased in June 1958.

The Transport Department continued operating a solitary tramcar and two flat top bogie trailers in Randwick Workshops yard between the general closure and 17th August 1972 when R1 1979 was donated to the S.P.E.R. tramway museum for preservation.

Tram operations continue as a tourist venture in Sydney. The S.T.P.S. operates one steam tram motor and three trailers at Parramatta Park on the third Sunday of each month. This working has developed since November 1956 when restoration of steam motor 103A was completed. Rides on electric tramcars can be sampled every Sunday at the Sydney Tramway Museum at Loftus where a large representative collection of Sydney electric cars, as well as units from interstate, is available to the public. This operation was officially opened on 13th March 1965.

Since 1966 the N.S.W. State Government has expressed the opinion that the trams should not have entirely disappeared from all Sydney routes and the first stage in a possible reintroduction of this mode of transport occurred in September 1973 when the State Minister for Transport, Mr. M. Morris announced his intention of establishing a committee to study the feasibility of constructing an initial system along Pitt and Castlereagh Streets linking the Central Railway Colonnade with Circular Quay. The basic service would be operated with modern tramcars with five toastrack cars, similar to the type which was once the backbone of the Sydney transportation system, available for tourist operations.



## CLASSIFICATION OF ROLLING STOCK

Around 1905 a general alphabetical classification was introduced to the N.S.W.G.T. although some years passed before the labourious verbal description vanished from official correspondence. Broadly speaking, the letters A and B were given to steam stock; C onwards to electric cars being awarded on a seating capacity scale. This exhausted the alphabet through to N (and later O) at that time. The letter T was officially planned for trailers, but it is doubtful if this was ever displayed on the side of such tramcars, while a similar situation existed for the steam tramway water sprinklers with the letter X. In this classification scheme S indicated general service, non-passenger carrying stock; with further sub groups of U for ballast motors, V for ballast trailers (SV being carried by those vehicles equipped with both air and vacuum brakes for both steam and electric service) and W for electric water sprinklers.

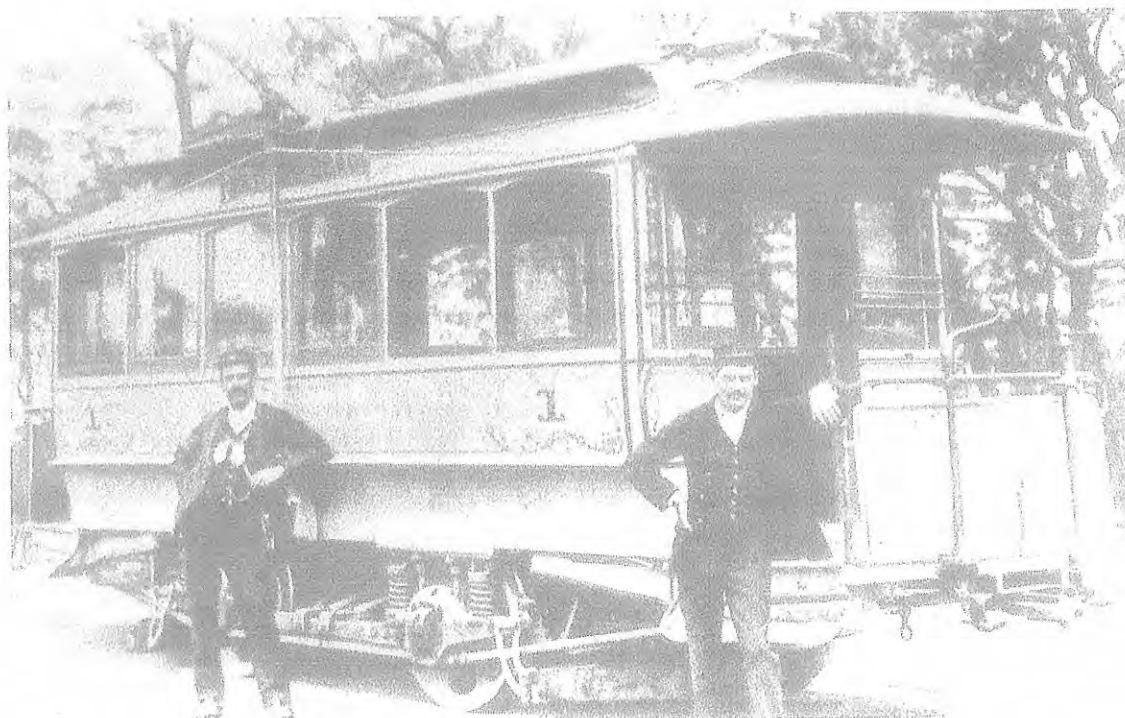
Later construction accounted for most letters remaining in the alphabet with the exception of I, Q, Y and Z. As three double deck trolley buses were carried on the Q type front entrance chassis these vehicles were known as the Q classification in some transport circles, but there was no official recognition of this letter being used as a class for trolley buses. On the other hand these buses were classified as a tram, probably to avoid paying road tax.

Prior to a state wide numbering scheme being used by the steam tram rolling stock around 1905, local numbers were used in Sydney and Newcastle and for a time on other isolated lines; while the motors and trailers each started from 1. It seems that the electric trams of the 1890's also had separate numbers for motors and trailers within each separate system and the unified numbering scheme was not introduced for the electric tramcars until 1898 when it was apparent that the isolated electric segments would eventually be joined and considerable rolling stock interchange could be expected, especially at times of major maintenance when a visit to Randwick Workshops was required on the main Sydney system.

O class cars dwarfed by the girders of the Sydney Harbour Bridge. The leading car is No. 1212 which made the first tram crossing of the bridge in 1932 and was still in service to make the last passenger run in June 1958.



## PASSENGER CARS



Sydney's first electric tram to draw power from overhead wires, No. 1 at North Sydney in 1893, after the equipment from the Waverley experiment had been installed on this cable tram feeder line.

### PASSENGER CAR NUMBERS AND CLASSIFICATION

1-3	Experimental cars	683	N (later Prison car)
4-97	C class (some T)	684-728	N
98-121	D	729-736	T (ex cable trailers)
122	F	737, 738	M
123	D	739, 740	H
124-139	G	741-745	J
140-288	F	746-802	K
289-291	C	803-805	K (destroyed before delivery)
292, 293	T (ex horse cars 199, 200)	803-947	O
294	F	948	Prison car
295	N	949-1279	O
296-395	F	1280-1329	K
396, 397	E	1330-1479	O
398-412	N	1480-1737	P
413-612	E	1740-1932	R
613-647	N	1933-2087	R1
648-682	J		

### CHANGES IN CLASSIFICATION

1. F class - all cars except No.393 became L type
2. L class - all L cars later converted to LP class
3. N class - No.704 converted to LP class
4. O class - Nos.855, 935, 943, 961, 1007, 1089, 1170, 1241, 1372, 1383, 1451 con-

- verted to OP class  
 5. P class — Nos.1517, 1562, 1573 and 1582 converted to PR1 class  
 — No.1691 converted to PR class

#### DUPLICATE NUMBERS

23, 25, 38, 39, 98, 101, 110 — J class  
 683 — ex cable trailer

The depots which housed these electric cars were generally, in the Sydney area, large brick structures surrounded by well kept gardens. The largest of all was Dowling Street which was able to house 345 passenger cars in 1948, most under cover. Depot locations and identification symbols carried on both the tram-cars and the fare tickets are listed below.

DEPOT	CAR	TICKET	DEPOT	CAR	TICKET
<i>Main Sydney System</i>					
Bridge Street	(a)	BS	Dowling Street	D	D
Fort Macquarie	F	F (FM)	Leichhardt	— (b)	—
Newtown	N	N	Rozelle	R	R
Rushcutters Bay	K	K	Tempe	T	T
Ultimo	U	U	Waverley	W	W
<i>Suburban Isolated Systems</i>					
Enfield	E	AM & N	Manly	M	M
North Sydney	(c)	S	Rockdale	(d)	T
Ritchie Street	(e)	RS & T			
<i>Newcastle System</i>					
Hamilton (f)	N/c	NC	Parnell Place (g)	N/c	NC
Wallsend (h)	N/c	NC			

#### NOTES:-

- Former Bridge Street yard steam terminal. Used for overnight stabling of cars attached to other depots.
- Available 1915, never used as a running shed.
- Military Road depot, North Sydney. Some trams carried 'M' depot plates after the closure of Manly depot in 1939. Opened 1909, to replace the Ridge Street cable (and later, electric) depot.
- Operated as a small 'out depot' of Tempe.
- Trolley bus depot. Replaced Sans Souci steam tram shed in 1937. Functioned as an 'out depot' of Tempe but some tickets carried 'SS' in tram days and 'RS' in the trolley bus period.
- Hamilton depot, Gordon Avenue, Newcastle.
- Main Newcastle steam depot, closed 1927. Road 17 electrified from 1924.
- A steam depot with one electrified shed road in which the last electric tram to Wallsend each evening was stabled overnight.



Experimental car No. 2 and cable trailer No. 1 (North Sydney roster) at The Spit Junction terminus, Military Road, c. 1895.

## EXPERIMENTAL CARS

(not given a classification)

Numbers: 1-3

(Total: 3 cars)

*Old Designation:* Rheostat cars

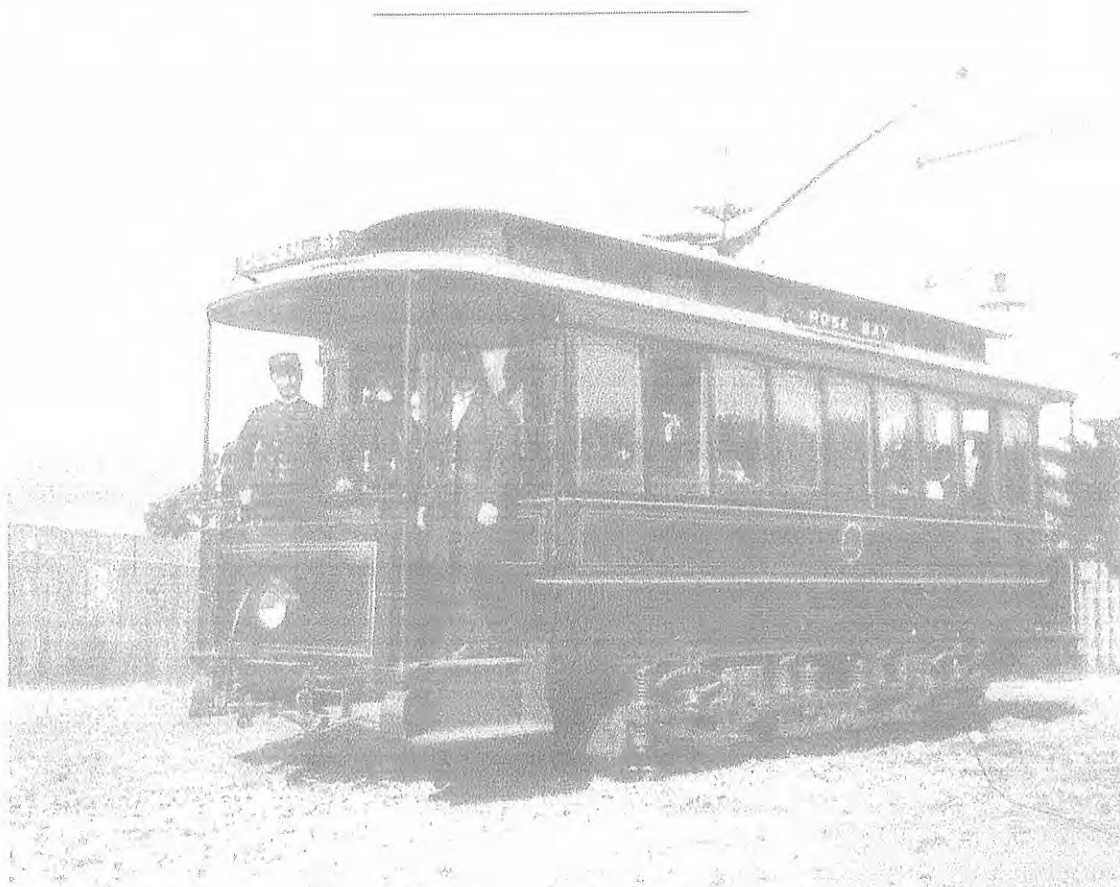
<i>Type:</i>	Single truck, end loading saloon car
<i>Built:</i>	John Stephenson of New York - 1890
<i>Seating:</i>	22
<i>Trucks:</i>	Thomson Houston with Bemis gear - all cars 1890-93; 2 & 3 1893- <i>circa</i> 1900; Bemis No.26 - Car 1 1893- <i>circa</i> 1900; Brill 21E - all cars 1900-1905.
<i>Motor Rating:</i>	2 x 10 hp (double reduction gears) - all cars 1890-93; 2 & 3 1893- 1895; 2 x 15 hp (single reduction) - Car 1 1893- <i>circa</i> 1900, then 2 x 25 hp (single reduction) - all cars <i>circa</i> 1900-05; 2 & 3 1895- 1900.
<i>Weight:</i>	7 tons
<i>Length:</i>	23 ft 0 ins

**PURPOSE OF CONSTRUCTION:** Trial electrification Randwick-Waverley, later opened pioneer line, Military Road, North Sydney.

**NOTES:** Arrived Sydney (26/6/90) on R.M.S. *Zealandia*. Waverley trial at the expense of T.H. Co., but Colonial Treasurer stated that cars and equipment purchased 12/11/90. Waverley line electrically worked for public 9/11/90 to 20/4/92, yet report (5/10/92) indicated line still worked by electric cars. Equipment and cars transferred to North Sydney for Military Road tramway, proposed and designed as a roadside steam tramway, opened on 20/9/93. Car 1 received Bemis No.26 truck for Nth. Sydney, and new motors but retained underfloor rheostat controller after 2 & 3 received K2 drum controllers in 1894. Ridge Street power plant increased (28/2/95) and cars 2 and 3 received larger motors. Waverley overhead located centrally along road, North Sydney used this centre wire but roadside track, so Waverley steel trolley poles with swivel wheel head relocated on roof side for Nth. Sydney cars. Nth. Sydney converted to central overhead November 1901, cars 1, 2 and 3 returned to central trolley poles. Just prior to this date, C and D cars carried dual trolley poles. Mounted on Brill 21E trucks *circa* 1900.

Hauled B class steam trailers in trials at Waverley and cable trailer cars regularly at Military Road.

*DISPOSAL:* Nos.1, 2 and 3 sold to Electric Supply Co. of Vic. (1905) to become Ballarat Nos.2, 7 and 9 (not respectively). Converted to California cars by Duncan & Fraser. Withdrawn 1932-34.



Nine-window enclosed electric car, later C class No. 29 or 33, at the outer terminus of the then isolated Ocean Street to Rose Bay electric line in 1898.

## C CLASS

Nos: 4-97, 289-291

(Total: 97 cars)

*Old Designation:* Enclosed electric car

*Type:* Single truck end loading saloon car

*Built:* Bignall & Morrison, 1896-7 - 4-8, 289-291 (trailers 2, 1, 3 resp.)

Hudson Brothers, 1898 - 9-17, 29, 33, 59

1899 - 19, 22-28, 30-32, 34-51, 53-58, 60-66, 76  
77

Clyde Engineering Co. 1899 - 78-91, 94-97

Hudson Brothers, 1900 - 18, 20, 21, 52, 67-75

Clyde Engineering Co., 1900 - 92, 93

*Seating:* 20 - cars 14-16; 22 - cars 4, 5, 9-13; 26 - others

*Trucks:* Peckham Metropolitan (several with Brill 21E/Sydney No.1 as a temporary measure)

*Motor Ratings:* 2 x 36 hp; some 2 x 25 hp and 2 x 42 hp; later 2 x 48 hp

*Weight:* Motor cars 8.41 tons to 8.6 tons; trailer cars 5.5 tons.

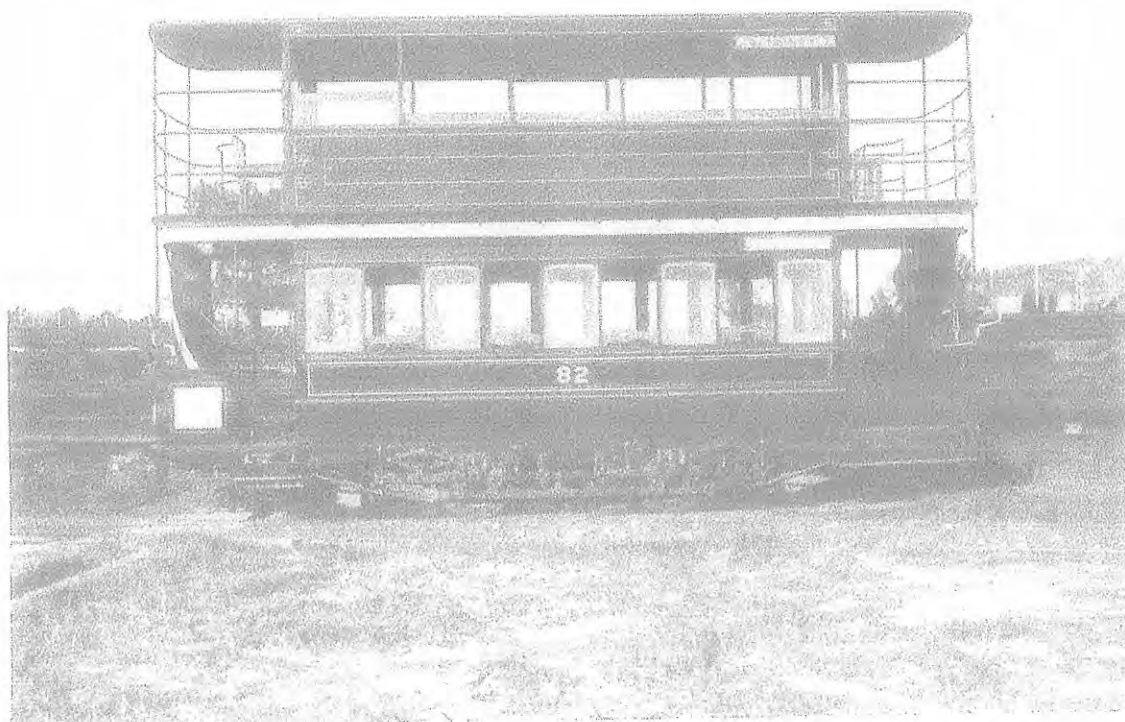
*Length:* 22 ft - Nos. 14-16; 23 ft - Nos. 4, 5, 9-16; 25 ft - Nos. 17-97;

26 ft - Nos. 6-8, 289-291



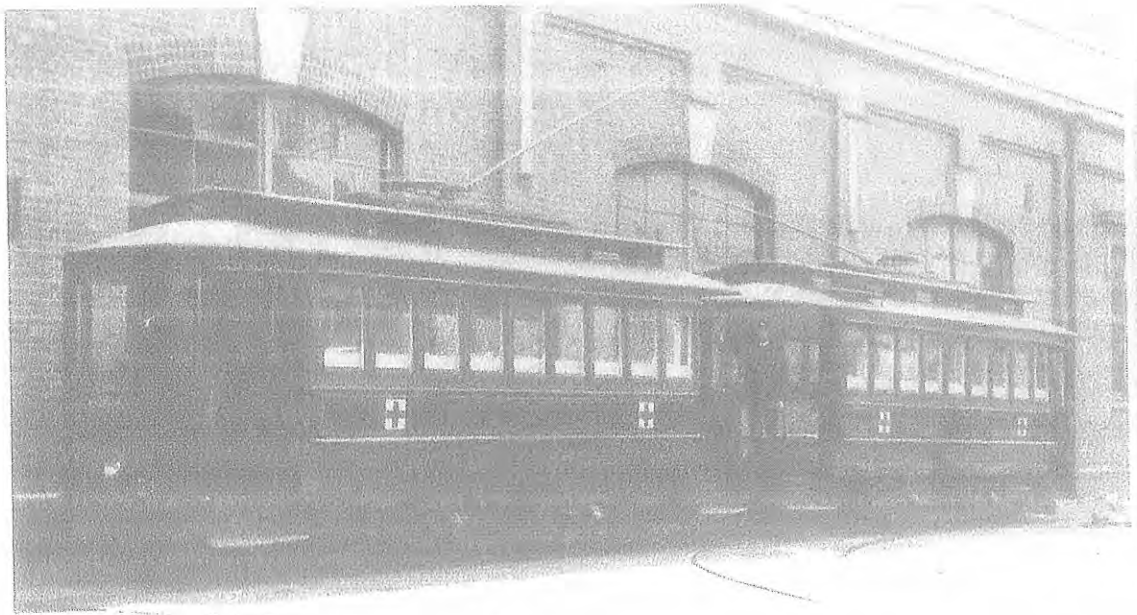
**PURPOSE OF CONSTRUCTION:** Pioneer electric lines at North Sydney and Rose Bay. Opened George Street, Sydney electric line (1899). Major use on North Sydney and Quay to Railway services.

**NOTES:** *Body variations:-* 5 side windows — Nos.4 and 5 (possible); 6 side windows — Nos.9-13; 7 side windows — Nos.14-16 (narrow body for use on cable tracks); 7 side windows — Nos.6-8, 289-291; 9 side windows — Nos.17-97. 41 cars entered service as trailers: 18, 20/1, 51-77, 81/3, 91/3-7, 289-291. Numbers allocated prior to uniform scheme of 1898: North Sydney — Nos.4-10; Rose Bay — Nos.1-6. Cars 4-10 retained, Rose Bay cars became 11-16, remainder allocated numbers as they stood on store roads prior to entering service. Allocation (1899) prior to general electrification:- North Sydney — 7 cars (4-10); Rose Bay — 9 cars (11-17, 29, 33); steam service — 4 cars (59, 289-291). No.17 used for driver training at Rose Bay (1898). Nos.11 and 33 in track brake trials Rose Bay to King Street (9/03); track brakes later fitted to Nos.12/7, 29, 39, 89, 92 and 93 on this line. Between 1909 and 1917, all cars on grades steeper than 1 in 12 needed track brakes; Nos.4, 5, 11, 20-22 fitted at North Sydney. From *circa* 1905 to 1915, C/D car sets 20/107, 21/109, 35/119, 36/120, 37/121, 79/106, 84/104 and 91/105 were permanently coupled and controllers removed from inner ends. Nos.33 and 82 converted on trial to double deck cars; operated (3/07 to 1/08) to test double deck v. single deck large bogie cars, latter won. Open driver's platforms fitted with windscreens (1911); on leading end only of coupled sets. Last North Sydney cars in passenger service:- Nos.9, 20, 22, 35-6 and 84 (October/November 1925); last Fort Macquarie cars:- Nos.27/57, 34/54, 41/61, 85/75, 94/88 (as coupled sets) in October 1926. Car sets 89/93 and 33/92 regularly hauled cable trailers on Quay to Railway service, known as "two rooms and a kitchen". Cars 31 and 44 permanently coupled, inner end controllers removed and the set converted to Ambulance trams (1915) to carry World War I injured soldiers between Woolloomooloo, Central Railway Station and Randwick Hospital. Used again in 1919 for influenza epidemic, dismantled 1925. Car 94 used as reconstructed 1861 horse car in Sesqui-Centenary parade in January 1938.



Double deck C class car 82 posed for the official photographer in Randwick Workshops yard, 1908.



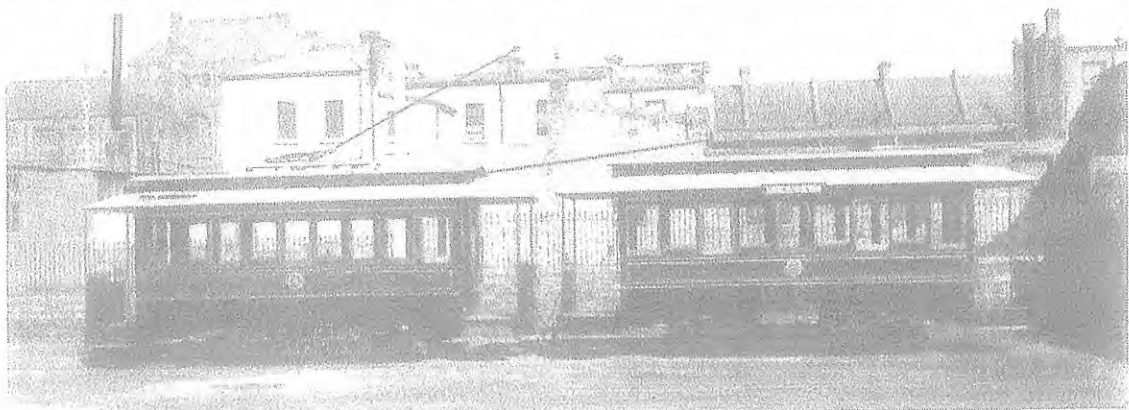


C cars 31 and 44 at Randwick Workshops after conversion to carry war wounded, on stretchers, from the Woolloomooloo Wharf to Randwick Hospital, 1915.

*DISPOSAL (For re-use):* Nos. 14, 15 and 16 sold to Electric Supply Co. of Vic. (1905) to become Ballarat Nos. 3, 5 and 8 (not respectively). Converted to California cars by Duncan & Fraser. Withdrawn 1931-35. Nos. 23, 25, 38 and 39 sold to Victorian Railways (1907) for St. Kilda line (bodies only; mounted on 5 ft 3 in gauge trucks), carried VR numbers 18-21, withdrawn 1912. No. 26 used as a trailer at Bombo (N.S.W.) Railways quarry (1923-5) with car 76 from 1917 to 1925. Nos. 19, 26, 47, 49, 59, 77 and 90 to Federal Quarry, Minnamurra, N.S.W. (1922) as workmen's huts, Nos. 77 and 90 last scrapped in 1951. Car 37 to Byron Bay on North Coast Steam Navigation Co. jetty tramway hauled by petrol loco (1924-63). Cars 52 and 56 to Abermain Colliery, N.S.W. (1923) for use as trailers in miners' trains. Burnt by bushfire in December 1956.

*SERVICE STOCK:* Nos. 7, 11-13, 20, 22, 29, 33, 34, 61, 68, 82, 85, 86, 88, 89, 92-94, 96, 290 and 291 converted to service stock for N.S.W.G.T., 1909-26. Last withdrawn 1962. (See separate section for details.)

*PRESERVED CARS:* C 11 to M.A.A.S, C 29 and C 290 to S.P.E.R., C 95 to S.T.P.S. Privately preserved:- Nos. 12, 33 and 37. (No. 29 leased for display in *Old Spaggetti Factory* restaurant in Sydney.) No. 37 transferred to S.T.P.S. (8/74).



(Later) C class motor and trailer in Ultimo depot yard prior to introduction into service on the George Street line in 1899.



Combination car No. 117, later D class, in Parriwi Road on The Spit line. No. 117 is running with a side mounted pole for the offset overhead wire; also a centrally mounted pole for the forthcoming change to centre overhead. c. November 1901.

## D CLASS

Numbers: 98–121, 123

(Total: 25 cars)

*Old Designation:* Combination car

*Type:* Single truck, California combination, straight sill car

*Built:* C.G. Hudson–Clyde Engineering – 1898 (123)

Ritchie Bros – 1899 (98–109) 12 cars

Clyde Engineering – 1899 (110–121) 12 cars

*Seating:* 32, later rated 34

*Trucks:* In passenger service – Brill 21E (Sydney No.1) – 98–109  
– Peckham Metropolitan – 110–121, 123

*Motor Rating:* 2 x 36 hp, later 2 x 48 hp

*Weight:* 9.5 tons.

*Length:* 28 ft 11¼ in, later 29 ft 11 in with drivers' protection at one end.

**PURPOSE OF CONSTRUCTION:** Initial Sydney electrification, then North Sydney cable line electrification and early extensions.

**NOTES:** Based on Brisbane Tramway Co. design. Some, possibly 98, 99, 103–5, 107–110 used as steam trailers 1899–1902. Car 123 used as trial sample tram on Rose Bay tramway (3/99); this car had elliptical roof, the remainder clerestory. By 1904, cars 98–101, 104–121 at North Sydney. Newell magnetic track brakes tried on No. 102 in 1904, became standard feature on early J cars. Car 102 used as observation tram (1909–13). Car 117 back at Waverley extension line in 1906 with regenerative brakes. Track brakes fitted to 107/9, 111/2/4/6 during 1909 to 1917 period, at North Sydney. Drivers' windshields fitted (1911) in the form of a projected balcony at one end of coupled cars and both ends of single units. At North Sydney, D cars hauled cable trailers, others coupled with C types after 1906 except Nos. 99 and 116 which operated as single units at North Sydney. Cars 102 123 and 117 were single cars on Sydney system at this period, while 103 worked coupled with (unmotored) C96 until 1915. Last passenger role for these cars was

carried out by 102 and 103 from Ultimo until November 1924 and Nos.99, 104, 107, 113/4/6/9 and 120 from North Sydney depot between October and November 1925. Car 114 lingered at Randwick until 1938.

**DISPOSAL FOR REUSE:** Nos.98, 101 and 110 sold to Victorian Railways for St. Kilda tramway in 1907. Operated as 15, 16 and 17 (not respectively) on Brill 21E 5 ft 3 in gauge trucks until 1913. Car 119 sold to Brisbane City Council in 1961 as 137S, operated as No.16 until 1968, truck and electric gear to S.P.E.R. museum tramway. Peckham trucks and electrical gear, possibly from 111, 112 and 121 sold to E.R. & S. Co., Port Kembla, N.S.W. for construction of steeple cab locos, in service 1927 to 1956.

**SERVICE STOCK:** Car 99 listed as North Sydney relief breakdown car in 1917. Cars 99, 102, 103, 105, 106, 116, 117 and 119 converted to scrubber cars 1913-31. No.123 as freight car and breakdown car at Waverley 1904-7, Breakdown 1907-31, scrubber after 1931.

**PRESERVED CARS:** No.102 to S.P.E.R. as 134S in 1961, D 117 preserved privately as 112S.

## E CLASS

Numbers: 396, 397, 413-612

(Total: 202 cars)

*Old Designation:* Coupled 45 passenger cars

*Type:* Single truck closed cross bench car, single ended, permanently coupled back to back in pairs.

*Built:* Randwick Workshops, 1901 - 396, 397  
Clyde Engineering Co., 1902-3 - 413-560  
Meadowbank Manufacturing Co., 1902-3 - 561-610  
Clyde Engineering Co., 1903 - 611, 612

*Seating:* 45 in each car

*Trucks:* McGuire A1 - 413-462  
McGuire Columbia, 6 ft 6 in wheelbase - 561-610  
Brill 21E, 6 ft 6 in wheelbase - 396, 463-560  
Sydney No.1 (21E), 7 ft 6 in wheelbase - 611, 612  
Peckham, 6 ft 6 in wheelbase - 397

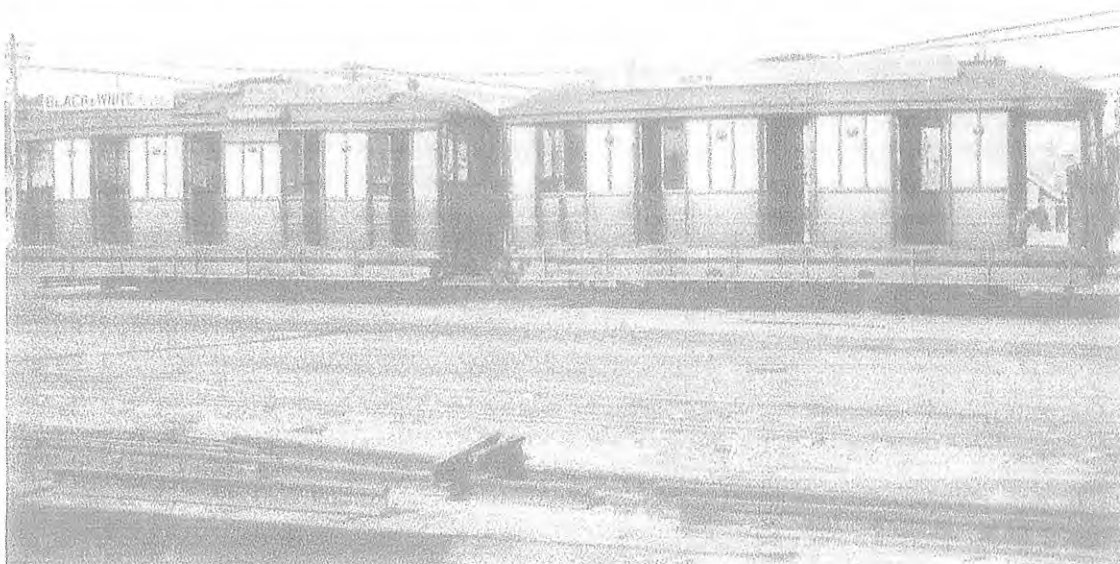
*Motor Ratings:* 2 x 48 hp (GE67) - 396, 397, 413-466, 551-612  
2 x 50 & 0 (GE203) - 467-550

*Weight:* 10.02 tons.

*Length:* 27 ft 5½ ins

**PURPOSE OF CONSTRUCTION:** Electrification of Eastern suburbs steam lines, later used on Railway to Quay, Bondi via Bellevue Hill and North Sydney lines.

**NOTES:** Flat front drivers' protection windshields fitted 1910-11. Fifteen seats devoted to smokers until 1917, then even numbered car of each set for smokers. 396-7 were sample cars. Permanently coupled into two car sets in consecutive numbers and wired as single four motor car with air brake compressor in even numbered tram. Nos.432 and 455 written off (3/21) and companions 431 and 456 coupled. 'One man tram' mock-ups made of 432 and 455 in 1920, not adopted. Hauled ex steam B type trailers on main Sydney system until 1911. Cars 609-610 believed first of group transferred to North Sydney (1904). Limited use of E cars on Manly system during busy holiday periods. Cars 467-70, 475-8, 483-4, 503-8, 519-26, 529-38, 541-2, 571-610 fitted with track brakes at North Sydney (1909-17) and also 485-6 on Bellevue Hill line. Improved track brakes fitted to 499-500, 521-6, 529-30, 537-8 after 1917 for Neutral Bay working. All this group, except 537-8 remained at North Sydney after others of class withdrawn, 1934-5. 521-6 withdrawn March 1950, 499-500 scrapped 9/55, 529-30 returned to Sydney (6/55)



Coupled 45 passenger (E class) cars 396 and 397 in Randwick Workshops yard after fitting of outer end windshields in 1910.



E cars 530 and 529 on tour, at the Centennial Park platform in April 1956 after their return from the North Sydney system.

and used on tours for remainder of that year. Cars 587-8 painted blue for Grace Brothers department store Christmas promotion (1925).

*PRESERVED CARS:* E 529 and 530 to S.P.E.R.





Prototype bogie combination (later F class) car No. 122 on trials on the Rose Bay line in August 1899. This car did not have the quarter light saloon windows as did the remainder of the class.

## F CLASS

Numbers: 122, 140–288, 294, 296–395

(Total: 251 cars)

*Old Designation:* Bogie combination car

*Type:* Bogie California combination car, with straight chassis sill and longitudinal exterior seats.

*Built:* Clyde Engineering – 1899 (122)  
– 1900-02 (remainder)

*Seating:* 48, later 44

*Trucks:* McGuire Maximum Traction and Brill 22E, later all Brill 22E

*Motor Rating:* 2 x 60 hp

*Weight:* 12.26 tons

*Length:* 38 ft 6½ in

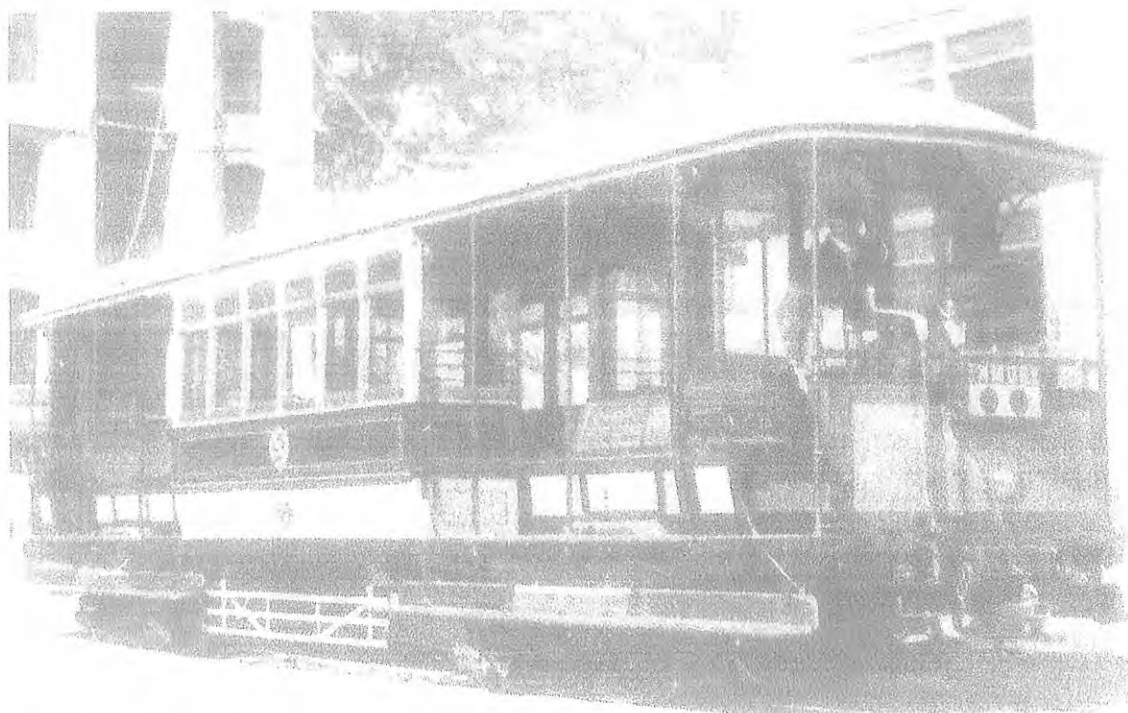
**PURPOSE OF CONSTRUCTION:** Electrification of western and south western Sydney suburban steam lines and extensions, some use on Eastern suburbs lines.

**NOTES:** Car 122 constructed as an experimental vehicle, tested on Rose Bay electric tramway August 1899. This car had single piece side windows with no quarter lights. Some F cars at Newtown depot were mounted on McGuire M.T. trucks, possibly Nos. 162 to 175, a total of 15 cars. Trial made with G.E. electric brakes on Dulwich Hill line (8/00), not adopted. Some F cars operated in coupled sets from 1900. By 1908, 56 trams could operate coupled. Seating reduced by 4 due to more liberal space allowance, not because of reconstruction. Car 169 carried roof mounted headlights in 1910.

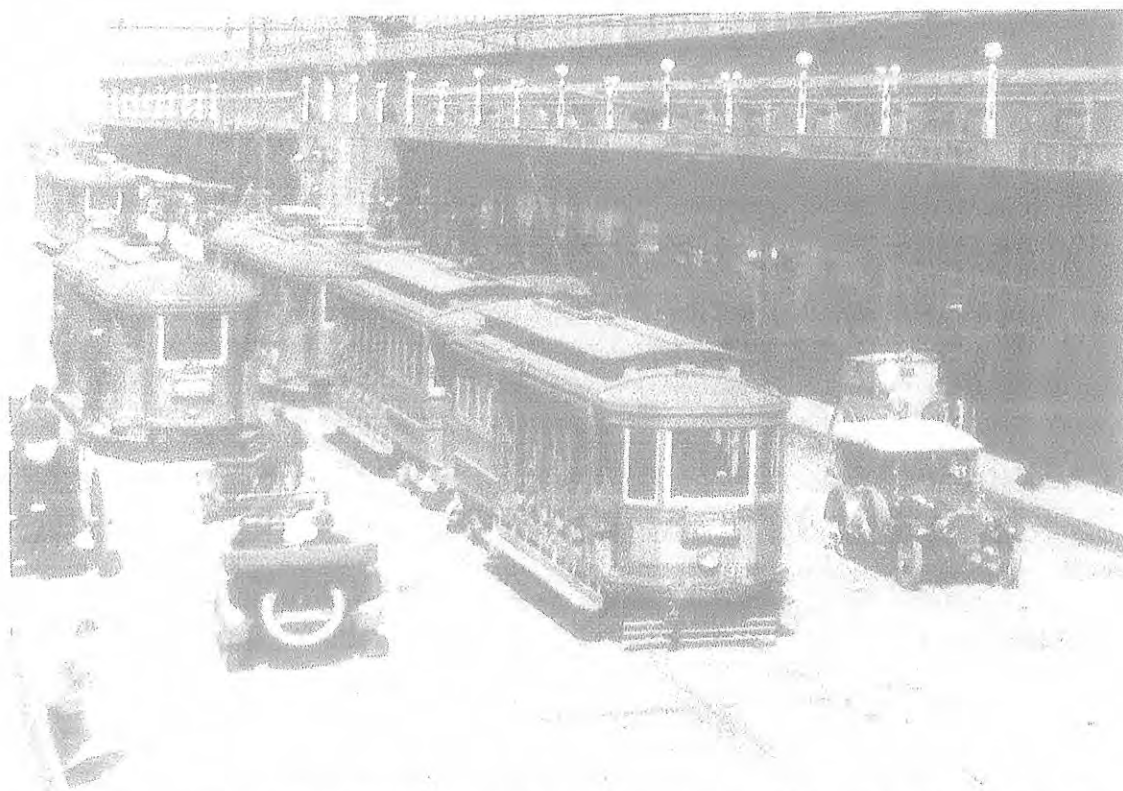
**CONVERSION:** In July 1906, cars 310 and 311 received cross benches in open portion increasing seating from 44 to 55 or 56; classified 'L'. All others except No. 393 converted between 1907 and 1914 after L 310 tested in traffic in December 1906.

**SERVICE STOCK:** During 1910, F 169 used as temporary freight car. Car 393 used as Drivers' Instruction car between 1910 and 1952. Until 1927 this tram received limited use in public service as well. Renumbered 127 S in 1927.

**PRESERVED CAR:** F 393 (127 S) to S.P.E.R.

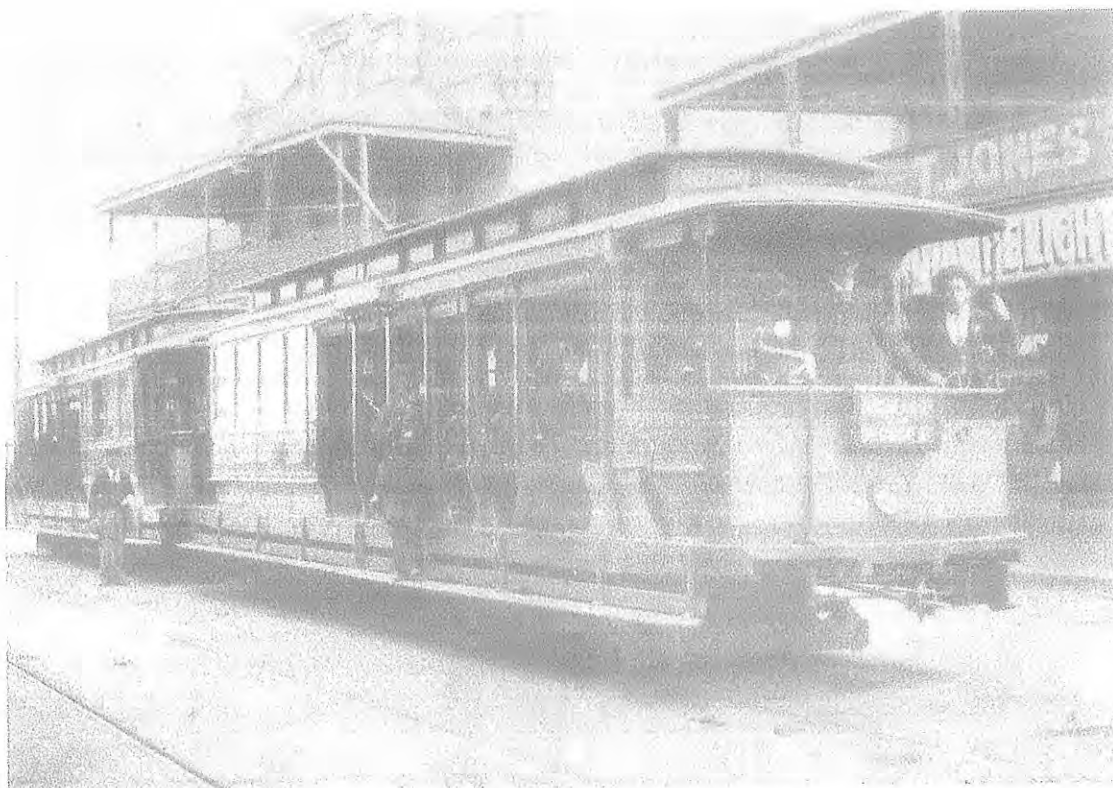


F class car No. 168 at Circular Quay loop in 1903. The air hose coupling may have been to allow for towing C or D type cars as trailers.



Brill-G class cars 134 and 135 after enclosed fronts were added. Note the footboard to the crossbench section only.





St. Louis-G class cars (possibly Nos. 128 and 129) in original form. The trams had still to be fitted with lifeguard shields and gates.

## G CLASS

Numbers: 124-139

(Total: 16 cars)

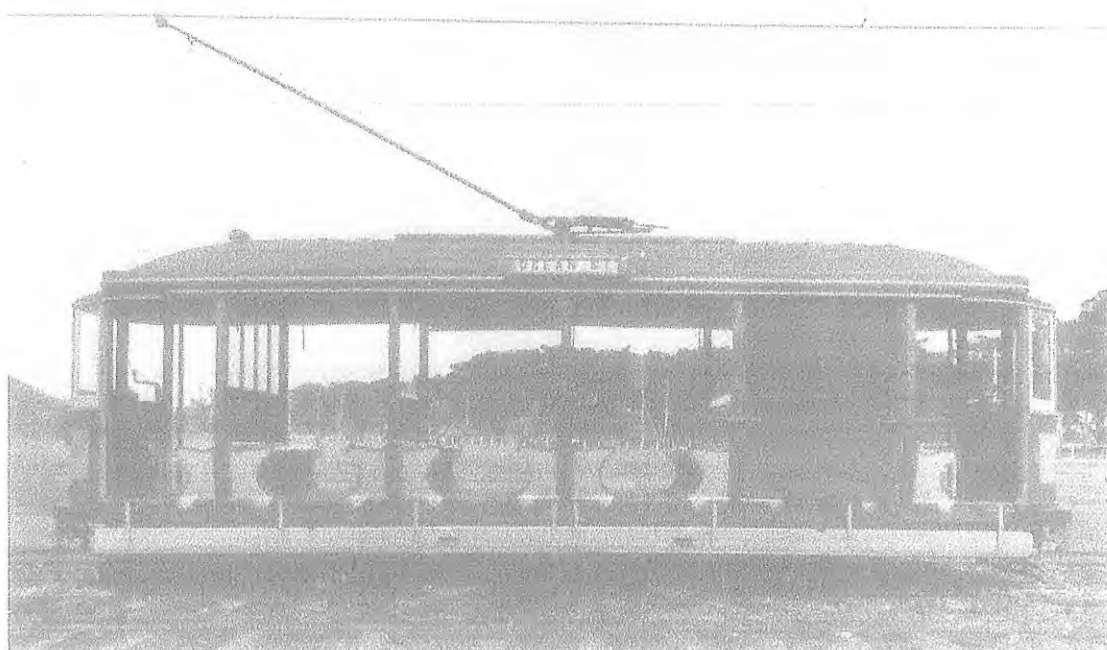
*Old Designation:* St. Louis or Brill cars

<i>Type:</i>	Bogie, half saloon, half open cross bench cars, with straight chassis sill and permanently coupled back to back.
<i>Built:</i>	American Car Co. of St. Louis - 1899 (124-131) J.G. Brill & Co. of U.S.A. - 1899 (132-139)
<i>Seating:</i>	51, later 49
<i>Trucks:</i>	Peckham Maximum Traction (14 D 2) - 124-131 Brill 22E <i>Eureka</i> - 132-139, later all Brill 22E
<i>Motor Rating:</i>	2 x 42 hp, later 2 x 48 hp
<i>Weight:</i>	St. Louis - 12.6 tons, Brill - 11.1 tons
<i>Length:</i>	St. Louis - 37 ft 3 in, later 38 ft 6¼ in with drivers' protection Brill - 36 ft 4 in, later 38 ft 4 in with drivers' protection added

**PURPOSE OF CONSTRUCTION:** Trial model for George Street electrification.

**NOTES:** Body variations: *St. Louis cars*-footboards full length of car sides, split back aprons to allow access between cars, turned spindles as decorative seat backs in open section, trolley base over saloon centre. *Brill cars*-footboards only along sides of open sections, offside protection beams and lattice steel tongs on end platforms, double doors in saloon bulkhead, solid slats on cross seat backs, roll up and strap side blinds, trolley pole located over centre of car. First set tried during early morning in George Street prior to opening during second week of November 1899. In service on George Street opening day (7/12/99). St. Louis cars entered service with single piece end aprons to prevent passage between cars. Brill cars entered service with offside loading prevention devices removed and trolley pole located over saloon centre. Brill 22E trucks replaced

Peckhams on St. Louis cars (1916-17). Drivers' protection windshields fitted to No.1 (outer) ends only (1911) in form of extended balcony. Cars 124 and 125 used on tourist services 1905-7, fitted with dual controls to enable single operation poles relocated over body centre, air hose connections on No.1 end. Cars 124 and 125 fitted with track brakes (1909-17). All cars first attached to Ultimo depot then Newtown and finally Tempe. 124 and 125 attached to Fort Macquarie during tourist runs. Entire class written off on 14/10/27, last to be scrapped was No.130 on 9th October 1930.



Official view of H class tourist car No.740 after the fitting of extended platforms and driver's protection. The bogie tourist (M class) cars were of similar appearance when so fitted.

## H CLASS

Numbers: 739, 740

(Total: 2 cars)

*Old Designation:* Tourist cars

*Type:* Single truck, open cross bench cars  
*Built:* Randwick Workshops — 1907 (739, 740)  
*Seating:* 50  
*Trucks:* Brill 21E, 6 ft 6 in wheelbase  
*Motor Rating:* 2 x 48 hp  
*Weight:* 11.6 tons  
*Length:* 26 ft 10 in, later 28 ft 0 in with drivers' protection added.

**PURPOSE OF CONSTRUCTION:** Tourist services on lines limited to four wheel rolling stock such as Watsons Bay and North Sydney.

**NOTES:** Design of these cars proposed by Electrical Engineer in January 1906. Alternative proposals were: fixed cross seats back to back; tip over cross seats; rigid single truck; radial single truck. Fixed cross seats on rigid 6 ft 6 in wheelbase truck adopted. Both cars appeared with magnetic track brakes. Used as standby trams for M type during close of 1906-7 summer season on Sydney lines. For 1907-8, No.740 worked Watsons Bay and 739 the North Sydney tourist routes, 739 having been transferred to North Sydney on 22/9/07. During 1908-9 summer,

only 740 in regular tourist run, to Watsons Bay. No.739 was official car at opening of Lane Cove line (13/3/09). In October 1910 both cars received air-wheel brakes and manual track brakes in place of magnetics at Randwick Workshops. Both transferred to North Sydney for Neutral Bay line working. Both cars transferred to Manly (25/1/11) to ease summer rolling stock shortage until substation increased for use of O cars on later Brookvale electrification, returned to North Sydney, possibly winter 1911. Used on Neutral Bay line until 5/17, returned to Randwick Workshops to have track brakes removed. Both cars worked public service on King Street line out of Rushcutters Bay depot until winter 1934 when transferred to Fort Macquarie depot. Received extended balcony type drivers' protection windshields to both ends (3/13). Officially attached to Rushcutters Bay depot but noticed stored at Randwick Racecourse sidings in 1933; to Leichhardt store depot (7/34), stored Fort Macquarie depot by 12/34, on scrap roads at Randwick Workshops (7/35), condemned 1936. Roof from 740 sold (2/38) rest of car scrapped.

**PRESERVED CAR:** Chassis and parts from No.739 used in the reconstruction of double deck steam trailer No.1, mounted on bogies with flanges turned flat, for display in Sesqui-Centenary parade (1/38), hauled by steam motor No.1 mounted on a tractor. Scrapped after celebration.



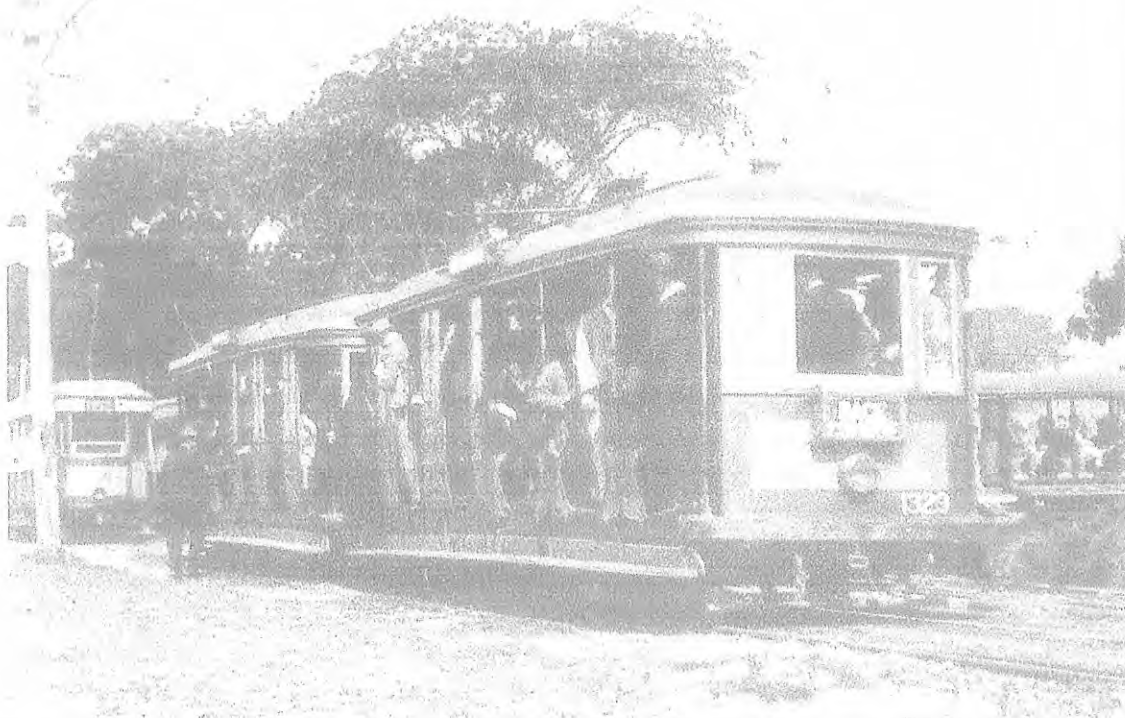
J class car 673 after attention at Randwick Workshops.

## J CLASS

Numbers: 648-682, 741-745,  
(2nd) 23, 25, 38, 39, 98, 101  
(Total: 47 cars)

*Old Designation:* 50 passenger enclosed cars

<i>Type:</i>	Single truck, closed cross bench car
<i>Built:</i>	Meadowbank Manufacturing Co. — 1904 (648-682) — 1907-8 (23, 25, 38, 39, 98, 101, 110) — 1907 (741-745)
<i>Seating:</i>	50
<i>Trucks:</i>	Meadowbank cars — Peckham, 7 ft 6 in wheelbase Chambers cars — Brill 21E, 7 ft 6 in wheelbase

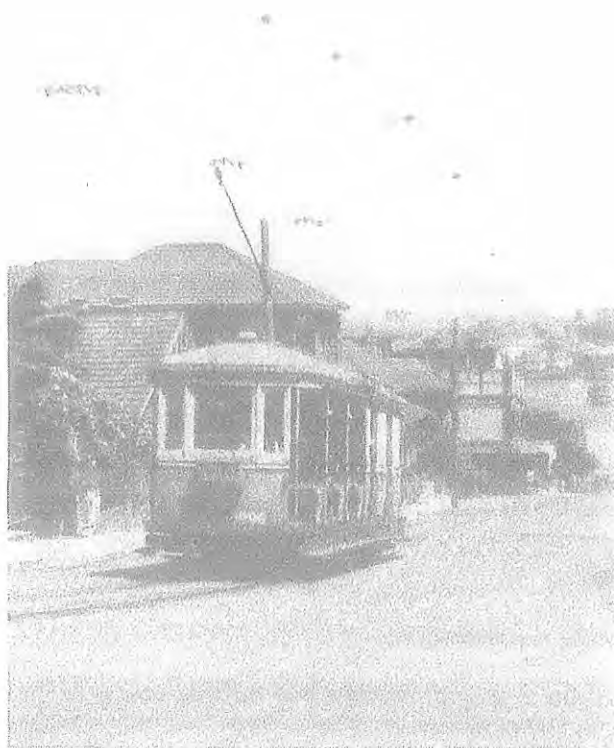


Coupled K class cars join the stream of crossbench trams loaded with punters en route to the major tramway terminal at Randwick Racecourse.

Second batch:- Improved Watsons Bay services, extension of Bellevue Hill line to Bondi, release of some Waverley E cars for North Sydney.

NOTES: First batch 'plumbed' for coupled operation but not wired, delivered 1/08, not needed for regular service until 1909. Forty five used during visit of American fleet in Fleet Week, 8/09. Three destroyed in Meadowbank Manufacturing Co. fire (2/6/08) possibly Nos.795/6/7. These numbers reallocated and 803/4/5 later used by O cars. Wired for coupled operation 1909-11. First batch received drivers' protection windshields on No.1 (outer) end only (1910-13), further nine cars usually run as single units received this on both ends. Nos.762 and 767 used on track brake and coupled set trials on Watsons Bay line (12/09). All K cars fitted with mechanical-manual track brakes (1909-17), many of first batch received these when new, only Nos.1295 and 1296 retained track brakes for Neutral Bay line after 1917. K 764 returned to Meadowbank as pattern for second batch (8/12), new cars entered traffic April-October 1913, fitted with windshields both ends and able to be coupled when new. Could not be coupled with first batch. K and J cars could only be coupled odd to even numbers (J 25 was considered an even numbered car) to enable short jumper cables rather than crossed cables between cars. Cars 1295 and 1296 first of class to North Sydney (5/17); fifty K cars at North Sydney 1934-5 when replaced by R cars on Watsons Bay and Bellevue Hill lines. Attached to Waverley, Rushcutters Bay and Fort Macquarie depots (105 cars) until 1934, transferred to Rozelle, Tempe and Dowling Street depots gradually after. In 1939; Nos.747, 751/5/6, 761/4, 777, 782 and 750 (10 cars) withdrawn; sold or scrapped. During World War II, 17 K's stored at Randwick, others, except Neutral Bay cars withdrawn 1948-9. K 1295 withdrawn from Neutral Bay (8/54), transferred to Dowling Street depot for tour, not held due to poor mechanical condition of car, to Randwick scrap roads (22/9/54). K 1296 and R1 2029 worked Neutral Bay until closure (26/5/56). 1296 transferred to Dowling Street (7/56), used on tours for the remainder of the year.





K class car 1296 on its way to the wharf at Neutral Bay, 1952. This was the last four wheel tram in regular passenger service in Sydney.

*DISPOSAL FOR REUSE:* No.763 as scrubber 138S and 797 as scrubber 139S to M. & M.T.B. in August 1959, still in use as cars 10 and 11. No.796 to Bunnerong Power House railway (1951), complete underframe used as oil tank car.

*SERVICE STOCK.* Nos.763 and 797 converted to scrubber cars 1952, 1953.

*PRESERVED CARS:* K 1295 privately preserved, appears in the Waratah Festival parades in Sydney each October. Underframe of No.746 used in reconstruction of bogie double deck steam tram trailer No.1 for use now in Waratah Festival parades by Transport Dept. (see H car notes), first used 29/1/51. K 1296 to S.P.E.R.

## L CLASS

Numbers: 122, 140–288, 294, 296–392, 394–395

(Total: 250 cars)

*Old Designation:* Cross seat bogie combination car

*Type:* Bogie California combination, cross seats in open ends, straight chassis sill.

*Converted:* from F type (q.v.) Randwick Workshops, 1906-1914.

*Seating:* 55 or 56.

*Trucks:* Brill 22E

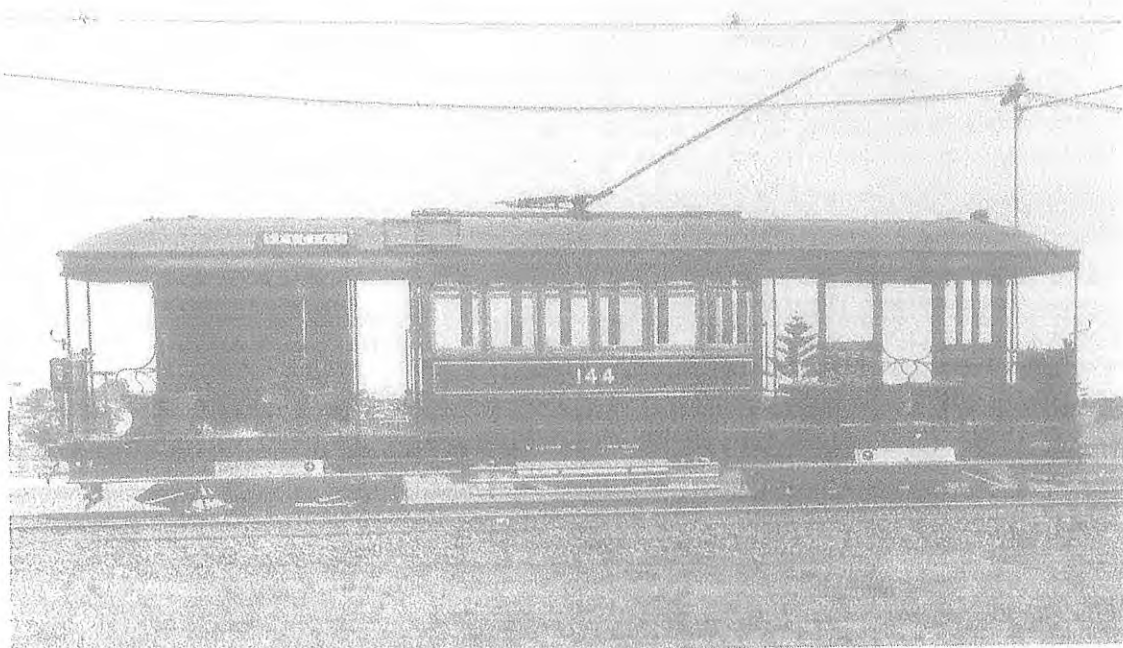
*Motor Rating:* 2 x 60 hp.

*Weight:* 13.07 tons.

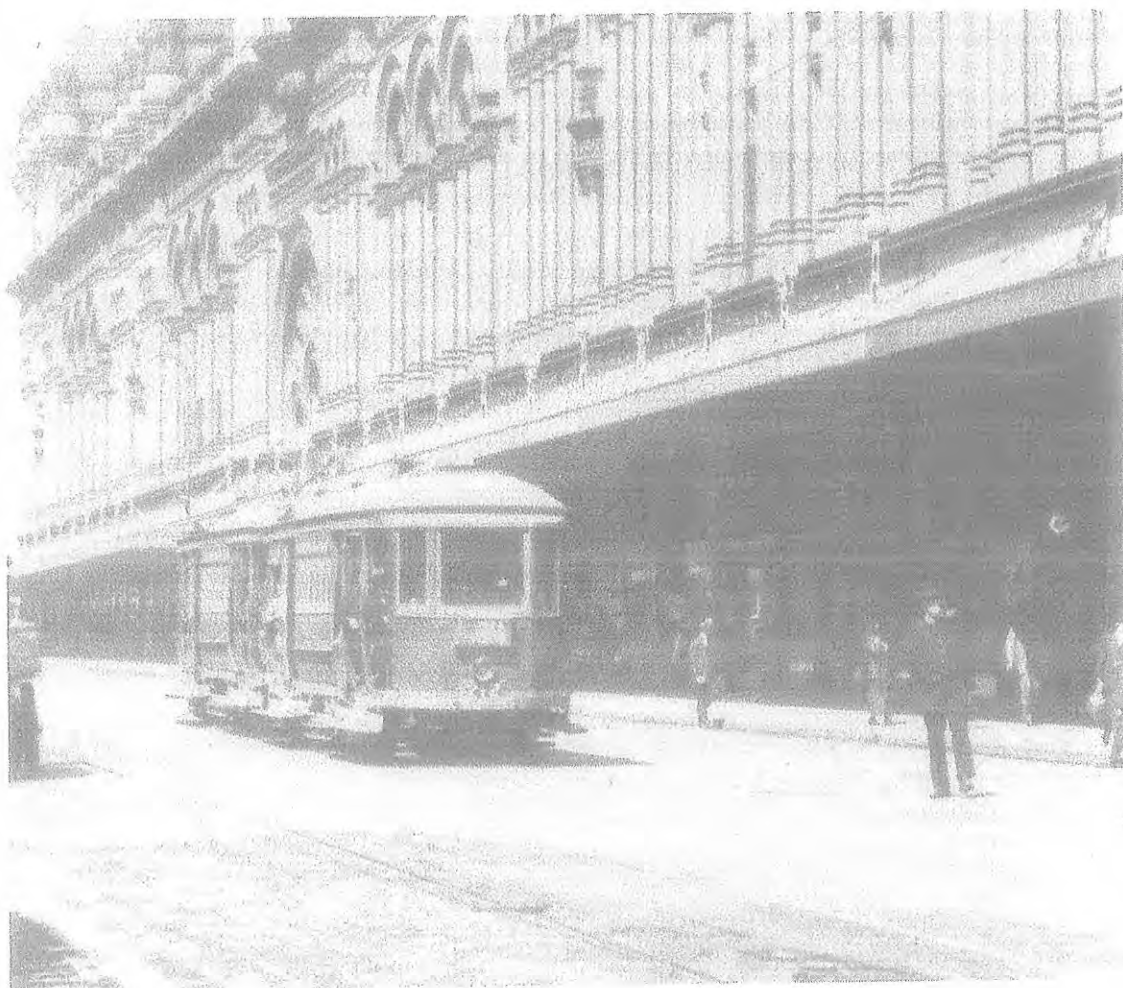
*Length:* 38 ft 6½ in, later 40 ft 9½ in with extended balcony drivers' protection added.

*PURPOSE OF CONVERSION:* To provide extra seating and to remove dangerous outward facing longitudinal outside seating on F cars.

*NOTES:* Conversion started on F 310 and 311 in July 1906, L 310 tested in traffic



An earlier conversion from the F to L class, No. 144 still has open end platforms. The tram would later go through a more dramatic rebuilding to the full crossbench style to be designated 'LP'.



Coupled L class car set, No. 212 leading, in George Street, bound for Fort Macquarie.



December 1906. No F cars received drivers' protective windshields, L cars fitted 1911-1914; only on outer (No.1) ends on cars generally coupled. By 1914 a total of 148 L cars could operate coupled. Car 122 retained single windows without upper quarter lights while in L guise. Passenger bench on driver's front platform fitted with hinged section in centre, reducing seating by one to 55 on front car. L 348 transferred to Enfield system (26/10/14) for trial operation on saving against O car operation on ton-mile basis during period of declining revenue. Trial commenced 16/11/14, concluded by 14/7/15 when car returned to Dowling Street. L car could not make up time during heavy loading periods to make train connections, so plan to use seven L trams to release eight O cars at Enfield dropped. In June 1913 L 299 ex Zetland going north along Macquarie St. failed to stop at Circular Quay East, collided with L 209 coupled with 210 bound for Cook's River via Circular Quay, throwing 209 on its side. This contributed to closure of Albert Street-Macquarie Street connection, junction of which was removed 16/4/15.

**CONVERSION:** All L cars converted to 70 seat LP enclosed cross bench design 1918 to 1930. First conversion completed 30/11/18 (L 274), last conversion 17th April 1930 (L 325).

## LP CLASS

Nos: 122, 140-288, 294, 296-392, 394-5, 704

(Total: 251 cars)

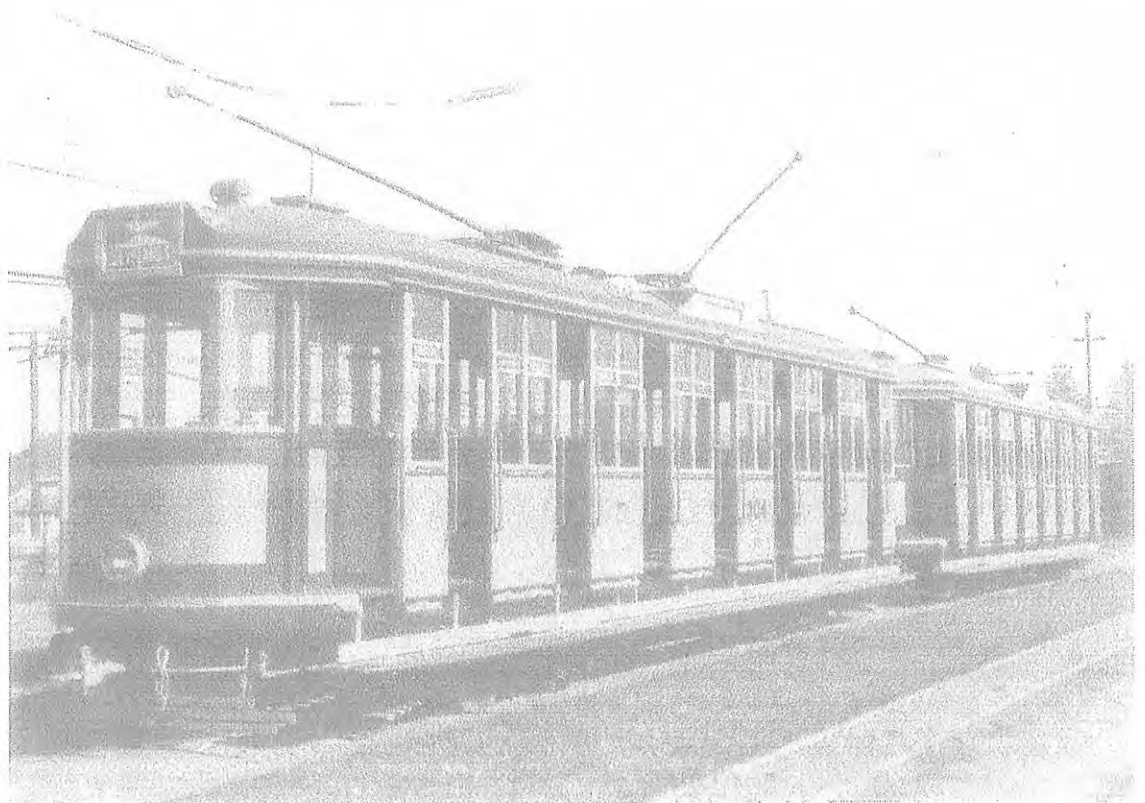
<i>Type:</i>	70 seat enclosed cross bench maximum traction car
<i>Converted:</i>	Randwick Workshops, Sydney - 1918-1930 converted from L and N types (q.v.)
<i>Seating:</i>	70
<i>Trucks:</i>	Brill 22E
<i>Motor Rating:</i>	2 x 55 hp - 150 cars; 2 x 60 hp - 84 cars; 2 x 48 hp - 17 cars (as in 1933)
<i>Weight:</i>	14.95 tons
<i>Length:</i>	40 ft 10 in

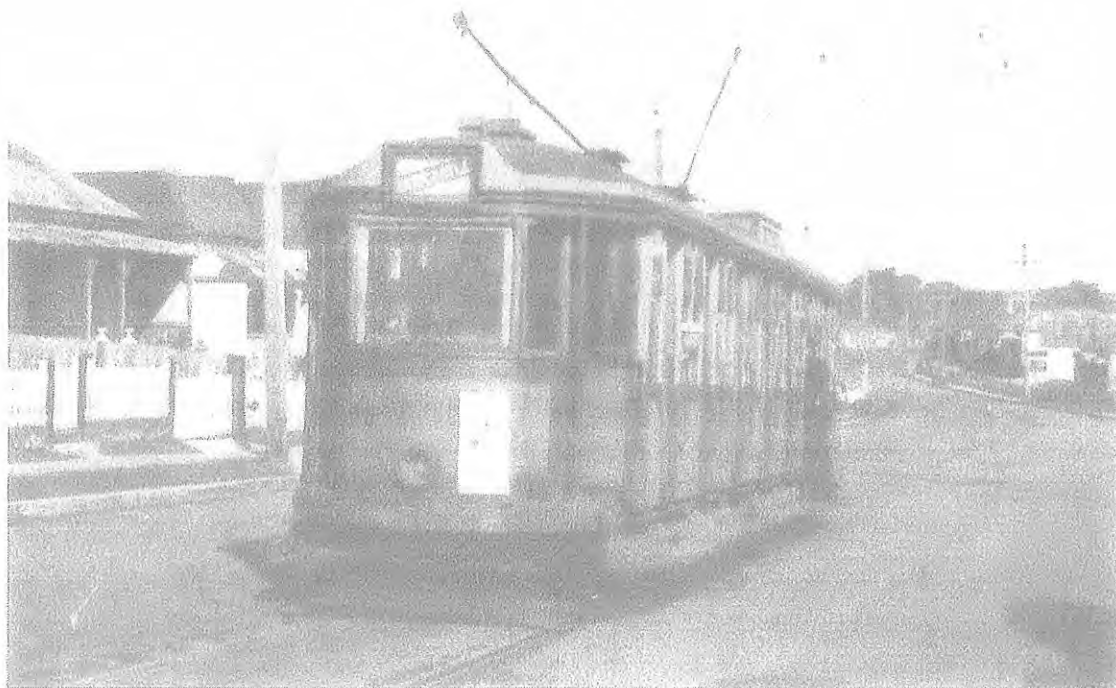
**PURPOSE OF CONVERSION:** To increase seating capacity of low capacity L type trams. To enable as many units as possible to conform to the then Sydney standard tram design. To provide new trams for Newcastle electrification, opened on 15th December 1923.

**NOTES:** All LP cars fitted with enclosed drivers' platforms. Car 274 was first converted (30/11/18); last conversion was No. 325 on 17/4/30. N 704 converted to LP design (q.v.) 29/3/23. Conversion rate:- 1918 (1 car); 1919 (14); 1920 (7); 1921-22 (0); 1923 (5); 1924 (49); 1925 (40); 1926 (37); 1927 (26); 1929 (33); 1913 (13 cars). First 21 conversions between 11/18 and 4/20 were Nos. 247, 270, 271, 272, 274, 280, 283, 285, 294, 296, 301, 304, 311, 330, 331, 342, 360, 367, 371, 375 & 376; these had low waist sill line, wooden tongue and groove "matchboard" sides, frameless windshield windows, side destination blinds illuminated by interior car lights, wooden wings to front destination box. Remainder of which No. 320 of December 1920 was the first, had high waist sill line, metal side panels (to take standard P type car window glass), framed opening windshield windows, side destination box with independent lighting, large metal wings on front destination box. All cars built with pull down door blinds; all Newcastle and most Sydney cars converted to concertina doors. Total of 98 cars to Newcastle (see table). Cars 274 and 704 first to arrive in Newcastle (30/9/23); current turned on 10/10/23, these two cars used on special training track at Gordon Avenue depot from 21/10/23. Ten Newcastle LP cars fitted (1927) with air connections at No. 1 end as LP trams could only couple at No. 2 end. These connections enabled haulage of B trailers (1926-35) and hearse trailers (1926-48). Cars fitted thus in 1927:- 247, 270, 280, 301, 311, 330, 371, 374, 376, 383. Cars fitted by 1948:- 146, 301, 310, 311, 371, 375. All Newcastle LP cars were fitted with DK83 motors.



ABOVE: LP 141 at the Merewether Beach terminus of the Newcastle lines.  
 BELOW: Fresh from the paintshop, low sided LP cars 304 and 371 at Randwick, in 1920; these cars were later transferred to Newcastle.





LP car No. 301 at the end of the half mile long Robert Street (Wallsend) loop in September 1949. This tram carries air hose couplings at the No. 1 end for towing the hearse trailers used on the Newcastle lines.

Thirteen Newcastle cars withdrawn from service (2/39) after closure of Port Waratah and Carrington lines; returned to traffic between May 1940 and late 1942. LP 236 destroyed in fire after colliding with truck at Jesmond (11/10/43), not rebuilt. Fifteen cars withdrawn (2/49) after Mayfield closure; remainder withdrawn progressively as Newcastle system closed. Car 147 on last public passenger service in Newcastle, on the Waratah line (10/6/50); No. 269 last tram on rails at Newcastle (2/8/51); No. 196 last complete tram at Newcastle as office on concrete roadway in bus depot until July 1953. No. 171 had seats rearranged and used as a mobile roster room at Newcastle depot (2/50 to 6/50). LP cars 272 and 274 retained low waist sills after accidents *circa* 1936, but received P type metal side panels. One Newcastle LP carried large side and front advertisements and roof mounted loudspeakers for A.I.F. recruiting campaign from 21/7/41; no passengers carried. A similar treatment was carried by a Sydney O car. This type of advert was carried by Newcastle trams during 1930's for commercial enterprises.

Car 310 in Sydney was fitted with a reinforced concrete floor in the centre three compartments, not adopted. Sixteen LP cars at Rockdale between 1920 and 1949 (see list). Reduced to a maximum of eight between 1943 and 1949. Last public service car at Rockdale was No. 220 on 3/9/49; last car to leave Rockdale system was No. 154 on 7/9/49. LP 191, ex Rockdale, was the first Sydney car of this class scrapped (25/1/50). Last regular use of Sydney LP cars was Easter 1951. Last batch withdrawn 17/10/51; last two burnt at Randwick were Nos. 192 and 328 on 25th November 1953. Cars 357 and 192 set aside for possible sale to Bellbird Colliery for use as miners' transport between pit entrances No. 1 and 2 to replace 2 ft 3 in gauge haulage way, not proceeded with, cars scrapped 9 & 10/53. Most LP cars in Sydney ran coupled during and after World War II with exception of single units on Drummoyne via Forest Lodge peak service.

**PRESERVED CAR:** LP 154 to S.P.E.R.; first tram in Australia preserved by an enthusiast group; first preserved electric tram to operate under its own museum

power (19/7/64). Used to officially open the S.P.E.R. museum tramway (13/3/65), first preserved electric tram in public museum service in Southern Hemisphere.

*LP cars to Newcastle:-*

*in 1923* – 247 270 271 272 274 280 283 285 301 304 311 317 342 360  
361 362 367 371 374 375 376 704 (22 cars)

*in 1924* – 145 147 148 149 150 151 163 171 172 177 178 188 194 196  
197 198 251 252 255 256 267 268 269 275 279 284 286 298  
299 302 303 308 315 316 322 327 330 331 332 341 348 354  
364 372 378 379 (46 cars)

*in 1925* – 140 141 146 161 162 187 189 190 195 201 236 244 377 382  
383 388 389 (17 cars)

*in 1926* – 144 165 173 231 232 235 243 265 266 312 321 345 384  
(13 cars)

*LP cars to Rockdale*

154 184 191 215 216 220 223 230 237 238 294 296 330 331  
386 387



After World War II, 52 LP cars in Sydney were repainted between December 1948 and September 1949 while delivery of the new R1 cars was delayed. Here coupled set Nos. 142 and 326 leave Randwick Racecourse in April 1950.



power (19/7/64). Used to officially open the S.P.E.R. museum tramway (13/3/65), first preserved electric tram in public museum service in Southern Hemisphere.

*LP cars to Newcastle:-*

*in 1923* – 247 270 271 272 274 280 283 285 301 304 311 317 342 360  
361 362 367 371 374 375 376 704 (22 cars)

*in 1924* – 145 147 148 149 150 151 163 171 172 177 178 188 194 196  
197 198 251 252 255 256 267 268 269 275 279 284 286 298  
299 302 303 308 315 316 322 327 330 331 332 341 348 354  
364 372 378 379 (46 cars)

*in 1925* – 140 141 146 161 162 187 189 190 195 201 236 244 377 382  
383 388 389 (17 cars)

*in 1926* – 144 165 173 231 232 235 243 265 266 312 321 345 384  
(13 cars)

*LP cars to Rockdale*

154 184 191 215 216 220 223 230 237 238 294 296 330 331  
386 387



After World War II, 52 LP cars in Sydney were repainted between December 1948 and September 1949 while delivery of the new R1 cars was delayed. Here coupled set Nos. 142 and 326 leave Randwick Racecourse in April 1950.





M class bogie tourist car No. 737 at the Abbotsford terminus on the shortlived tourist run.

## M CLASS

Numbers: 737, 738

(Total: 2 cars)

*Old Designation:* Bogie tourist car

*Type:* Maximum traction bogie open cross bench car.

*Built:* Randwick Workshops — 1906 (No.737)  
1907 (No.738)

*Seating:* 70

*Trucks:* Brill 22E

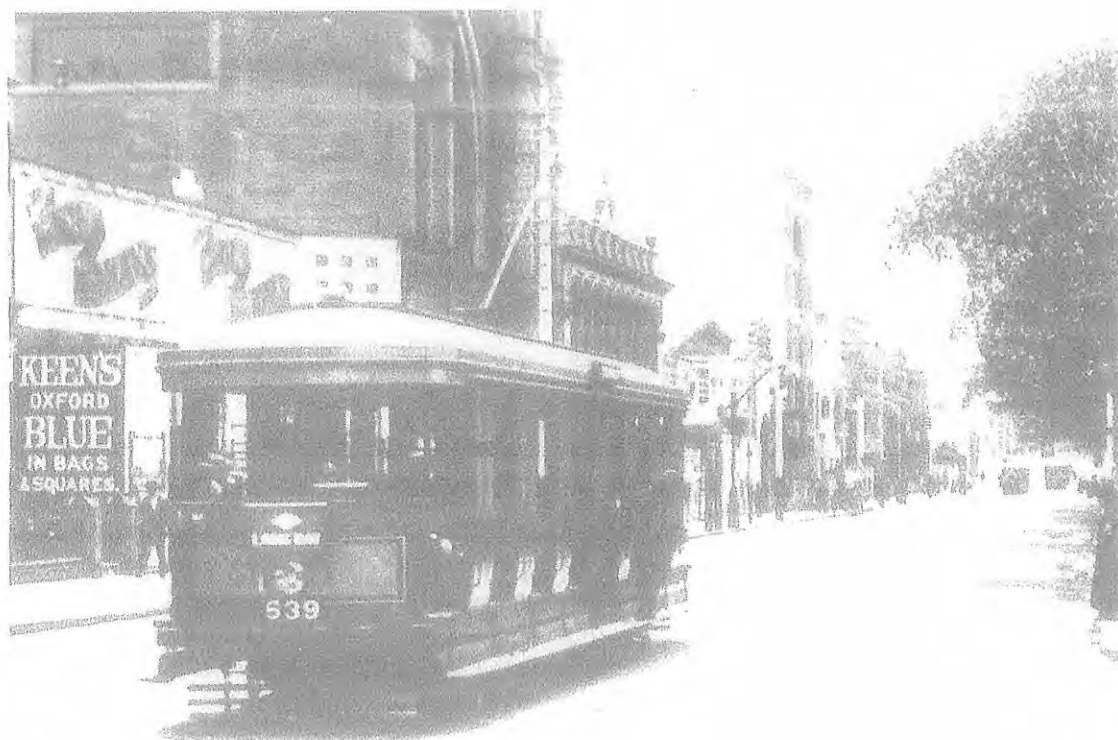
*Motor Rating:* 2 x 60 hp.

*Weight:* 13.06 tons

*Length:* 35 ft, later 37 ft 3 in with drivers' protection windshield.

*PURPOSE OF CONSTRUCTION:* Tourist services on lines using bogie cars.

*NOTES:* Design proposed by Electrical Engineer in January 1906. Alternative proposals were: fixed cross seats back to back, tip over cross seats. Former adopted. Both cars introduced during 1906-7 summer tourist season to replace G cars on tourist service. Used 1906-7 on 2 runs: Bondi—Coogee and La Perouse—Botany; 1907-8 on 3 runs: as above and Drummoyne—Abbotsford; 1908-9, 1909-10 as for 1906-7; 1910-11, 1911-12, 1912-13, 1913-14 on 3 runs: Bondi—Coogee, La Perouse—Botany and Ryde. Fitted with magnetic track brakes when new, these removed 1911 when air brakes installed and extended balcony type drivers' windshields fitted. Received internal transverse passenger grab rails 1919. Attached to Fort Macquarie depot during tourist workings, then Newtown. To Ultimo depot after World War I. Mainly used on peak hour workings to Drummoyne and Erskineville as well as Racecourse and Showground traffic until 1940. To Randwick store roads November 1940, dismantled 1941.



N class car No. 639 in original open fronted form in Elizabeth Street, Sydney bound for Long Bay (La Perouse).

## N CLASS

Nos: 295, 398-412, 613-647, (683?), 684-728

(Total: 96 cars—possibly 97)

*Old Designation:* 70 passenger car

*Type:* Enclosed cross bench bogie car. Car 295 — partial centre aisle when built

*Built:* Randwick Workshops, 1901 — 295  
 Ritchie Brothers, Auburn, 1902 — 398-412  
 Randwick Workshops, 1903 — 613 (possible)  
 Meadowbank Manufacturing Co., 1904-05 — 617-647, 683(?)  
 1905-06 — 684-728

*Seating:* 60 — cars 613-617; 66 — car 295 as built, later 70; 70 — remainder

*Trucks:* Brill 22E

*Motor Ratings:* 2 x 60 hp

*Weight:* 14.28 tons.

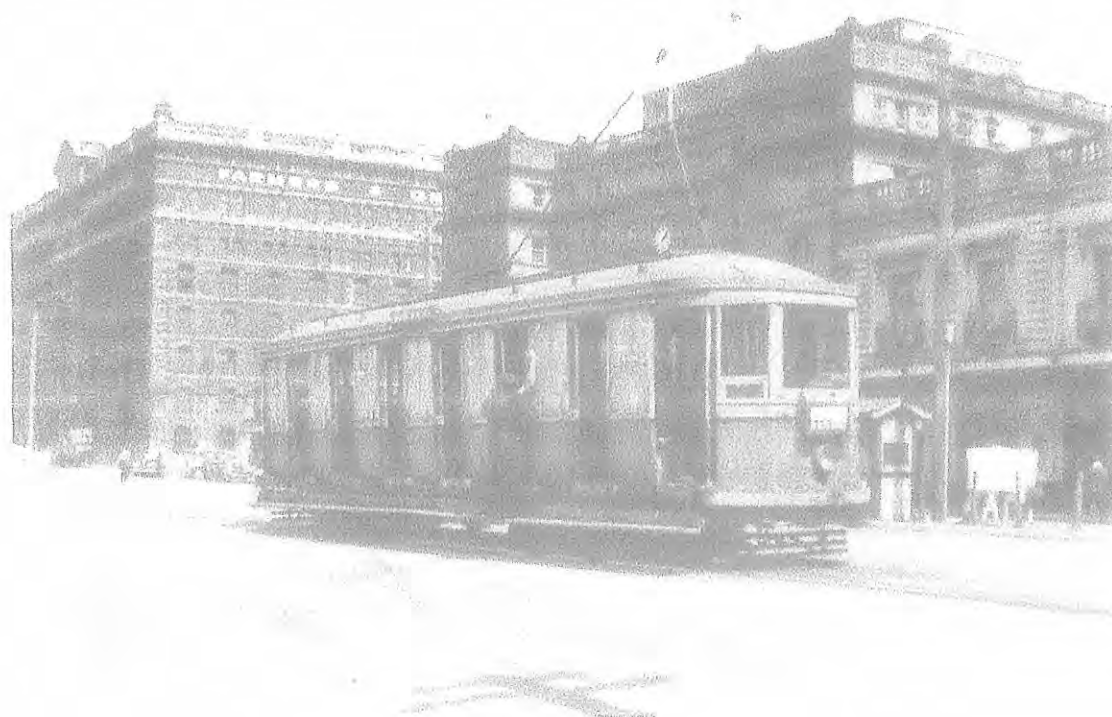
*Length:* 37 ft 4 in as built; 39 ft 4 in with extended balcony drivers' windshields fitted to all cars except Nos. 613-617 which received flat front windscreens.

**PURPOSE OF CONSTRUCTION:** No. 295 — trial high seating capacity bogie car. Nos. 613-617 for all night services. First batch (1902) for Balmain electrification and Drummoyne extension. Second batch (1904-05) for Abbotsford and La Perouse electrification. Third batch (1905-06) for general service improvements in Sydney and removal of most steam from special sporting services.

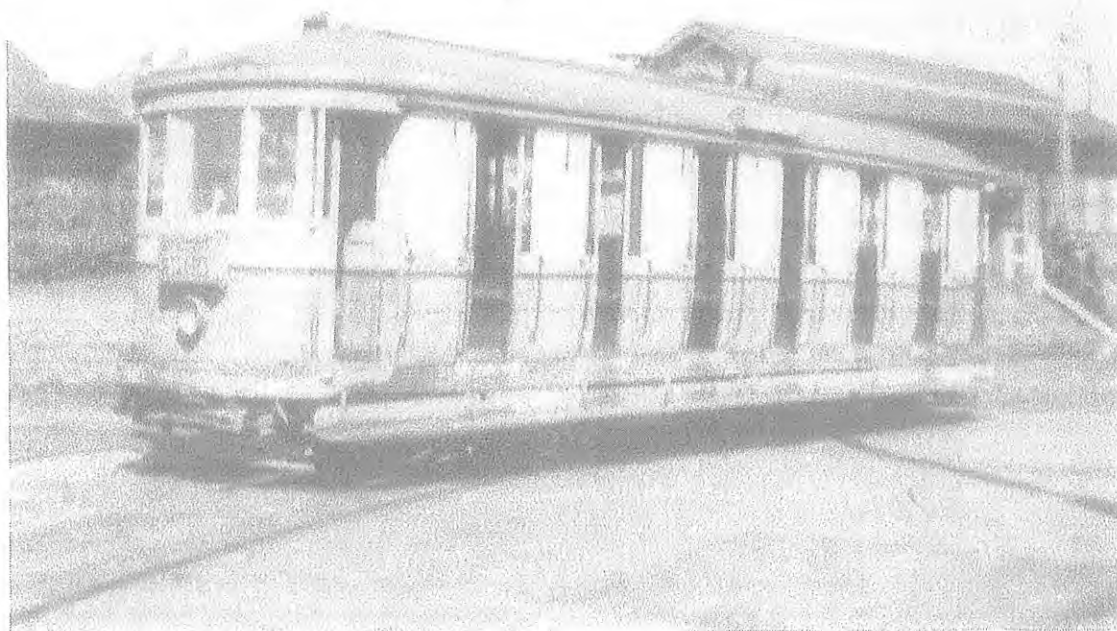
**NOTES:** Records show 97 N cars built. Car 683 believed built, out of service by 1908 when King Street cable trailer No. 25 given this number. Parts of this N car used in construction of Prison car. First car, No. 295, entered traffic (8/6/01) with aisle linking two sets of centre compartments, double footboards serving two centre doors and air brakes. Cars 398-412 entered traffic (August-December 1902) with single footboards and no centre aisle (295 converted to this form 1902), air

brakes. Car 613 experimental all night tram with flat front drivers' windshields (3/03); relocation of handbrake staff meant no passenger seats on drivers' platforms. Nos. 614-617 entered service in this "all night" form 12/14. Cars 618 to 647 and 683 entered service (12/04-3/05) fitted with air brakes and wider door opening than previous N cars. Cars 684-728 entered service (12/05-4/06) with magnetic brakes. Cars 699 and 711 tested *Ackley* and *Peacock* hand brakes 1905-1910, last batch had magnetics replaced by air brakes 1908-12. Extended front drivers' protective windshields fitted to all 70 seat N cars 1908-13. Cars 630-647 fitted with air brake connections for hauling B trailers on eastern suburbs lines 1905-13. C type trailers hauled on Coogee line 1908. Cars 619, 622, 688, 689, 720-24 (9 cars) at Rockdale for periods during 1914-22 and 1924-39. Nos. 619/622 converted to run coupled for Rockdale (1/24). Rockdale cars fitted with air brake connections for hauling passenger trailers and railway S trucks (the latter between Rockdale and Saywell's Brighton-le-Sands power house). Cars 401, 407, 410, 620, 623, 642, 619, 635 and 640 received vacuum braking gear and stripped of electrical parts for transfer to Newcastle as steam trailers (1915), first six sent 1916 saw little use as riding dropped during World War I; returned 1920. No. 642 to Rockdale as trailer from Newcastle until 1924. Nos. 635 and 640 used as Rockdale trailers between 1916 and 1918. All returned to Sydney service as electric motor cars. Cars 721 and 723 used in Miller Trolley Shoe tests at Rockdale (1920). Three D and two N cars proposed for electric operation at Maitland, 1923; conversion not carried out. Following cars used on Enfield lines:- No. 620 (1934-5), 701 (1940-4) 707 and 708 (1947-8). Thirty five cars placed in store at Randwick Workshops after 1939, some returned to traffic during World War II. In 1948 N cars were attached to Enfield, Ultimo, Tempe, Dowling Street, Rozelle and Newtown depots with 30 in Randwick, these latter disposed by March 1949. Nos. 619 and 622 ran permanently coupled 3/40 to 10/49 while on Sydney system, with old grey-olive-fawn colours. From 2/50 N cars 720, 721, 725 and 728 used as drivers' instruction cars out of Dowling Street depot; as such were last N cars in service, until March 1953.

**CONVERSION:** N 704 converted to LP design after severe fire damage 20/11/22.



One of the last N class cars in passenger service, No. 703 sets out across Circular Quay before returning to the Railway on a mid-day George Street shuttle run.



The modified form of No.617, a 60 seat 'Short N', is evident in this photo taken at the entrance to Dowling Street depot in March 1948.

**PROPOSED CONVERSION:** During December 1905 drawings were prepared of the proposed conversion of an N car to a double deck design retaining cross seats for 60 on lower deck and tip over transverse 2 x 2 seating on roofed but open sided top deck for 44. Not adopted.

**PRESERVED CARS:** N 709 privately preserved 3/51. N 728 to S.P.E.R.

## O CLASS

Numbers: 803-947, 949-1279, 1330-1479

(Total: 626 cars)

*Old Designation:* 80 passenger car

<i>Type:</i>	Bogie cross bench, half open, half enclosed car
<i>Built:</i>	Randwick Workshops - 1907 (806) Meadowbank Manufacturing Co. - 1908-14 (remainder)
<i>Seating:</i>	80
<i>Trucks:</i>	As built:- Sydney No.2, 4 ft 0 in wheelbase - 803-897 Sydney No.4, 4 ft 0 in wheelbase - 898-947, 949-1140, 1142-1279, 1330-1479 Brill 51E, 4 ft 2 in wheelbase - 1141
<i>Motor Ratings:</i>	4 x 37 hp, 4 x 40 hp and 4 x 43.5 hp
<i>Weight:</i>	16.5 tons - 806, 898-947; 17.5 tons - remainder
<i>Length:</i>	45 ft 5 in

**PURPOSE OF CONSTRUCTION:** Enfield and Manly electrification, general traffic increase and extensions on main Sydney system, replacement of some initial electric rolling stock, release of four wheel stock to lines requiring four wheel cars.

**NOTES:** On night of 31st October/1st November 1907, F car 147 hauled the under-frame of 806 (class leader) from Randwick Workshops to Circular Quay-Millers



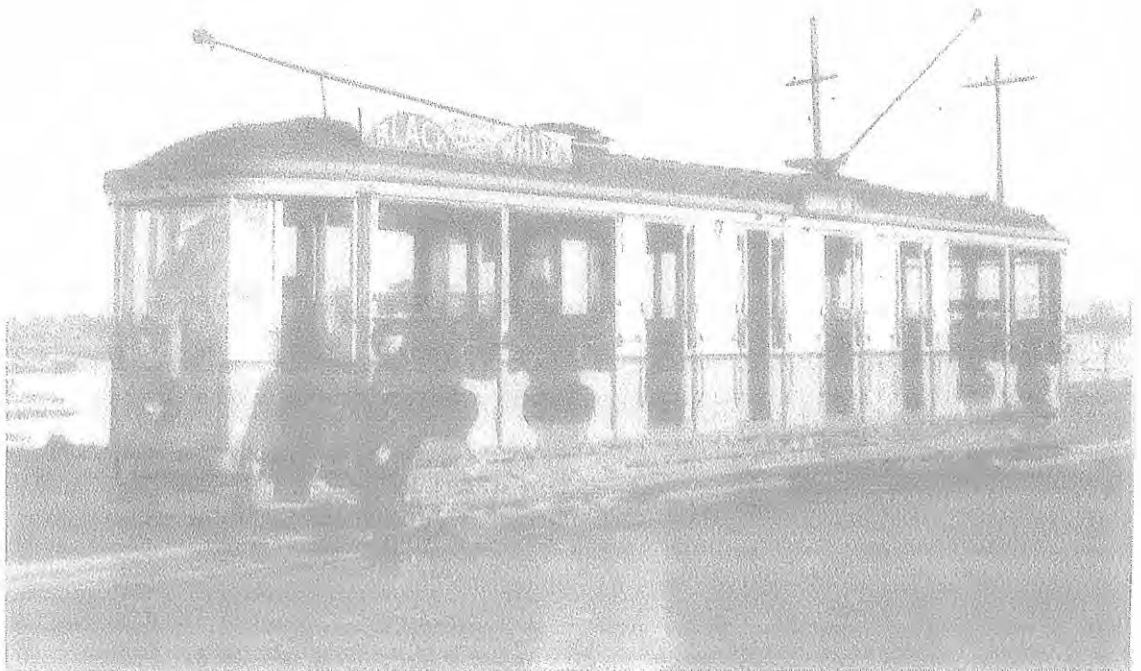
coupling O cars be built for needs after June 1915 (to be numbered 1480-1529), but this was not done. Kneeshaw's death (15/3/14) and World War I prevented route expansion and rolling stock increase. Leichhardt depot constructed to house rolling stock increase from 1914, but the conservative expansion policy of Traffic Superintendent E. Doran and other post war factors intervened and Leichhardt only used as store.

First O cars to North Sydney (28/1/18) on Mosman line, but O cars transferred through North Sydney from 1911 for Manly line. No.989 housed in North Sydney depot (4/11) for Manly system. First O cars to Manly, 807/8/9, 991/2 on 2-3/5/11, permanent number attached to Manly: 22 (in 1937), 17 (1939) plus others borrowed from North Sydney. Car 816 last passenger trip from Manly Wharf to the depot (30/9/39), O 1331 last to leave Manly for North Sydney (20/10/39).

O cars used for Enfield electrification opened 4/2/12. Due to space limitations at Enfield, Ocar 1046 stored at Parramatta steam tram terminus on eve of changeover. By October 1914, cars 1040-1061 (22 cars) at Enfield, grown from 16 (cars 1045-1057) in February 1912, and 20 (cars 1040-1059) by December 1913. O cars at Enfield system 1912 to 1948:- 1004, 1040-1063, 1080, 1139, 1142/4, 1169, 1189 and 1356; at closure 27 O and 2 N type. Last car in passenger service at Enfield was O 1061 (21/8/48), last to leave system were Nos.1050 and 1061 on 16/12/48. Cars 1330 and 1342 at Rockdale from March to December 1929.

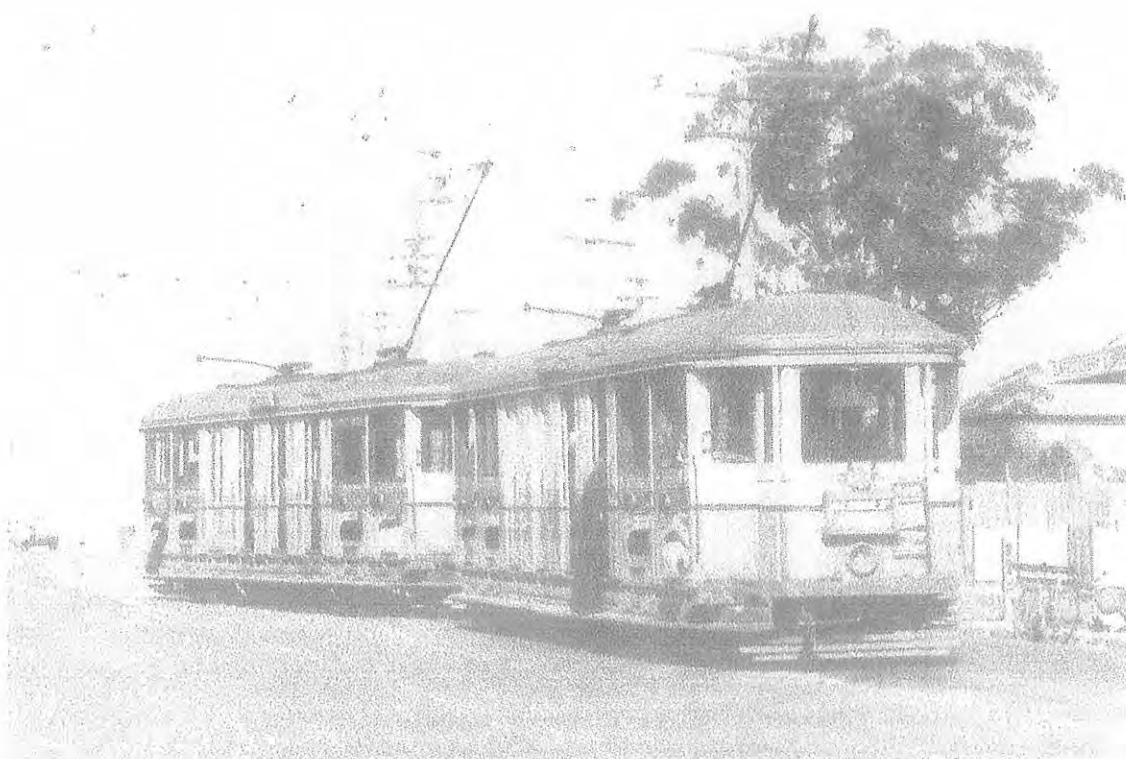
Cars 1106 and 1212 tested Sydney Harbour Bridge track (10/3/32) and used on isolated tracks between Milson's Point and Wynyard station for driver training until 19/3/32 when the ceremonial crossing was made; the line opened the next day. Last North Sydney trams in service were O cars 1347 and 1212 on 29/6/58. Last O to leave North Sydney was No.1335 on 6th August 1958.

Car 1270 was fitted with slatted timber/steel life shield (7/14) and others progressively fitted, in place of steel plough type. No.1371 was fitted with route

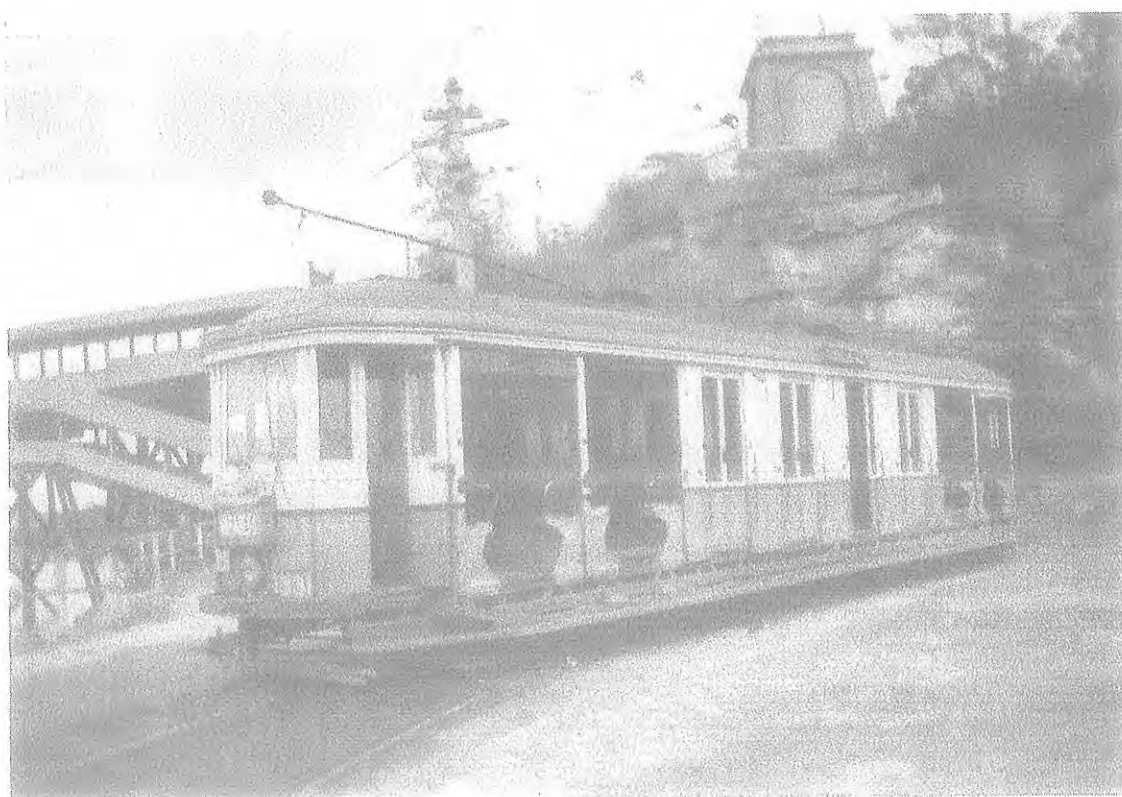


Direct control O car No.937 at Cooks River terminus. The D.C. O's could be recognised by their lack of air and electrical couplings and the higher mounted headlight and destination box.





A coupled set of O class cars, Nos. 1001 and 1015, sets out for the city from Abbotsford in July 1954.



O car 1331 photographed at the Spit terminus, Manly side, prior to being loaded onto the tramcar ferry after the Manly system closed in 1939.

number box on trial (2/21); number range for routes — 1 to 48, not adopted. From 1920, O cars received a single door on the left hand side of each drivers cabin, first group opened with air brake handle, all later received brass knob lock. From 1918, longitudinal inside passenger grab rails with 32 straps replaced by transverse rails, one to each compartment. Nos.1126 and 1172 received extra rails, two to each compartment (10/41); others, but not all received these after 12/47. No. 1079 fitted with internal metal ceiling lining (11/52), other cars fitted were Nos. 950, 1003, 1050, 1166, 1400 and 1478.

Cars 1277/8/9 received dual 600 v-1200 v equipment (6/15) for high voltage tests on Ryde Station line; proposed for Narrabeen line and extensions beyond, but not adopted. Dual equipment carried until 2-12/40. No.924 moved to isolated track at Dangar Street conductors' school, Randwick (3/53). This direct control car had destination box removed from one end and M.U. sockets fitted to show coupling techniques. Removed December 1957. Battery powered red dewirement tail lights fitted to O cars 1114, 1210 and 1271 and 3 R cars (q.v.) in February-March 1948. Not adopted as it would have cost £25,200 for entire fleet, trial was discontinued (10/48), and equipment removed over following two years. After a conductress was killed (6/10/49) replacing pole at night, from 8th October all cars carried oil lamps fitted with red bulls eye as tail light.

'Dead mans' button control fitted new to M.U. cars 803-5, 807-897, 949-998, Removed after 1911 as this control only cut off power, did not apply brakes. Post World War II plans envisaged O cars receiving GE 247D motors, 26 cars already had these in 1940. Initial order of 400 motors (for 100 cars) arrived in 1947, O 1359 was fitted 9/47, a total of 192 O trams received these by 1954 when programme stopped.

A plan compiled in September 1951 envisaged retention of a compact Sydney tramway system with 278 O class and 8 OP class cars to be retained. By October 1953, cars to be retained and originally fitted with No.2 trucks received No.4 type. Nos.864 and 867 first noted, 29 planned to be so changed. Delivery of post World War II R1 cars and route closures enabled direct control O cars to be withdrawn by January 1952, some returned to Easter traffic from store in 1952. Stripping commenced at Randwick Workshops 1/53, first car scrapped No.899 (20/5/53). Last O into Randwick for scrapping No.808 (8/12/58), last to be disposed, of non preserved cars was No.1359 on 8th April 1959.

No.1420 was fitted with steel tubular off-side loading prevention bars as a trial on two open compartments in March 1952. In traffic on Botany line; bars wired up by crew, soon withdrawn. Last coupled operation, cars 1111 and 1187 on tour on 11th January 1959 when both cars were officially handed over for preservation.

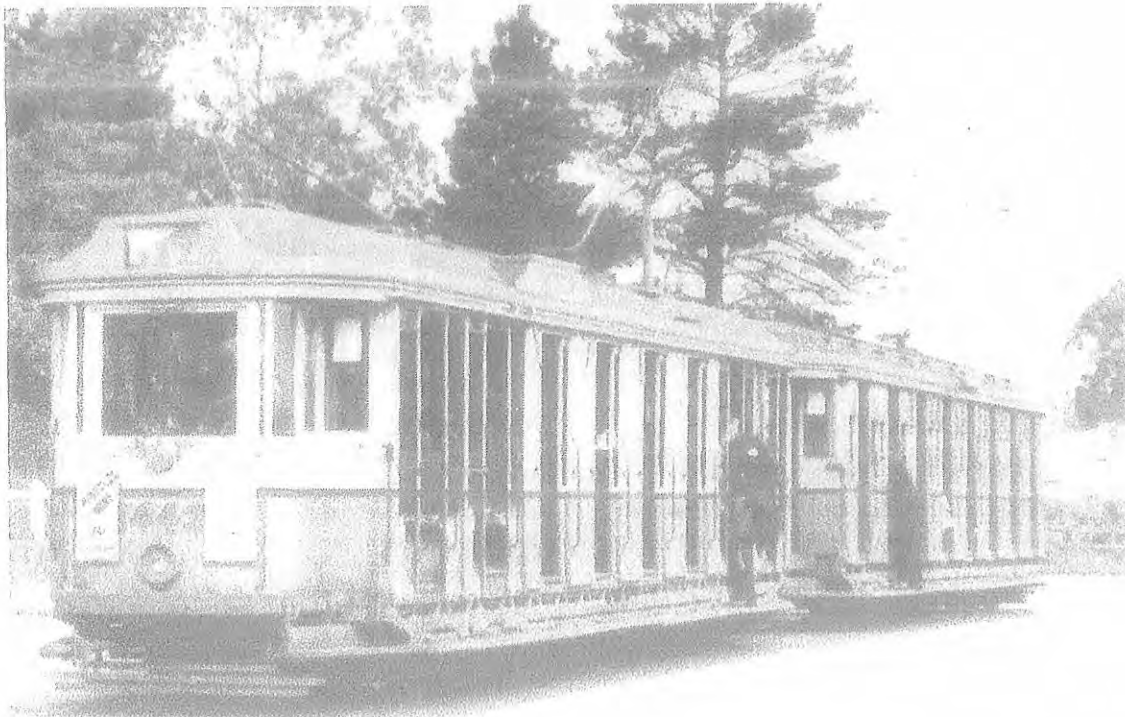
**CONVERSIONS:** Car 1443 received roof mounted, built in front and side destination boxes, three blinds in place of one on each side of open compartments and tongue and grooved ceiling lining 5/21. Retained O classification. Standard O seat ends and single blinds re-installed 1/53. Car 961 received roof mounted destination boxes and LP type side panels in smoking compartments (6/22), not classified OP until April 1947.

**CONVERSION TO OP TYPE:** The following cars were converted to OP type (q.v.): Nos.855 (6/20), 935 (4/19), 943 (4/19), 1007 (9/18), 1089 (6/20), 1170 (8/18), 1241 (11/19), 1372 (10/31), 1383 (12/45) and 1451 (5/46).

**CONVERSION TO SERVICE STOCK:** to *breakdown cars*: No.822 to 140 S (7/55), 1030 to 141 S (9/55), 1229 to 142 S (10/55) and 1000 to 143 S (11/55). Car 937 was converted to flat top yard mule (10/53) for use at Randwick Workshops.

**RENUMBERED CARS:** The following cars were renumbered *circa* 1954 for curious reasons:- 832 to 1431, 974 to 1087, 1246 to 1095, 1101 to 1120, 1151 to 1163, 1160 to 1202, 1414 to 1171, 1255 to 1337, 1340 to 1475 and 1393 to 1411!

**PRESERVED CARS:** O 805 to M.A.A.S., O 1111, O 1030 (as 141 S) and O 1089 (as an OP car) to S.P.E.R. O 1187 to Oregon Electric Railway Society., U.S.A.

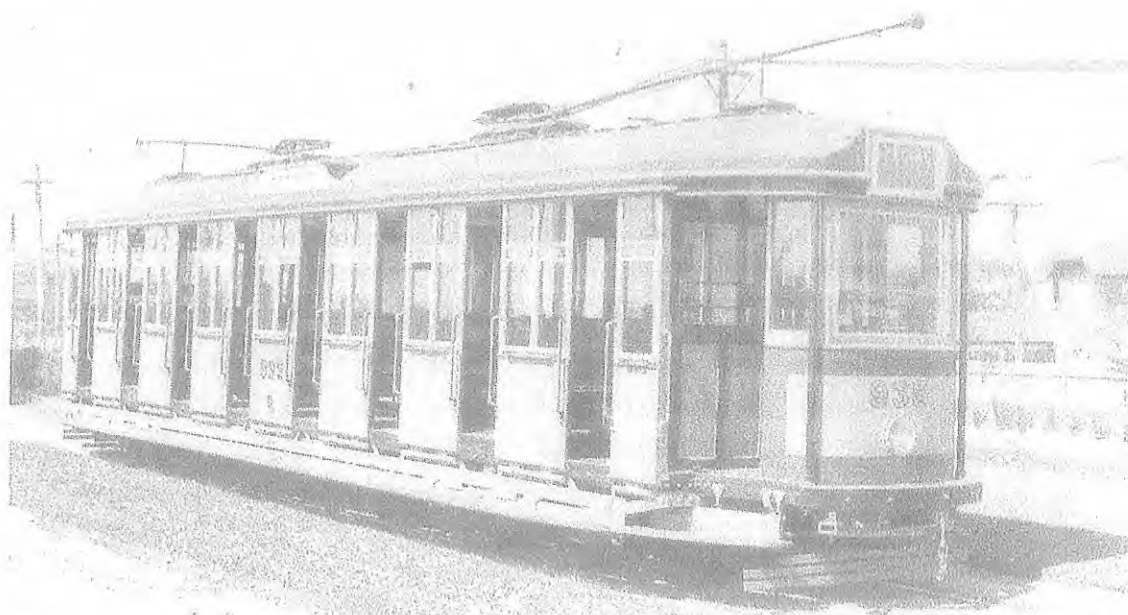


Partially converted O car 1443 later had the open compartments restored but retained the roof mounted destination box; seen here with OP 1451 on the Ryde line in 1949.



O961 with P-type side panels in the end compartments only, at Circular Quay in 1937 prior to reclassification as 'OP'





Direct control O car 935 as it appeared in 1919 before taking up running after rebuilding into an early form OP car.

## OP CLASS

Nos: 855, 935, 943, 961, 1007, 1089, 1170,  
1241, 1372, 1383, 1451

(Total: 11 cars)

*Type:* Bogie enclosed cross bench car  
*Converted:* Randwick Workshops, Sydney — 1918-1946  
 converted from O type (q.v.)  
*Seating:* 80  
*Trucks:* Sydney No. 2 — 855; Sydney No. 4 — remainder.  
*Motor Ratings:* 4 x 37 hp, 4 x 40 hp, 4 x 43.5 hp  
*Length:* 45 ft 5 in  
*Weight:* 17.1 tons — 935 and 943; 18.3 tons — remainder

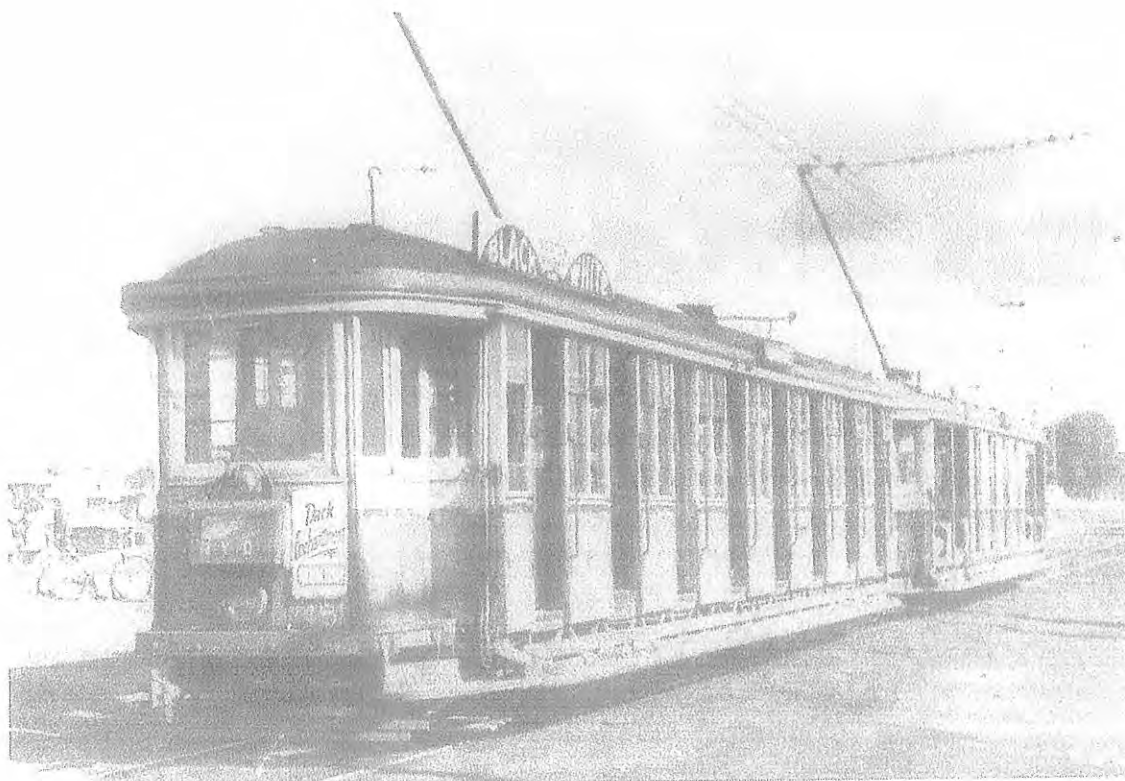
**PURPOSE OF CONVERSION:** O cars converted to P type body style after major collisions or fire damage.

**NOTES:** No. 1170 first car converted to OP body style (26/8/18); first tram with P style body. Two major types of conversion:-

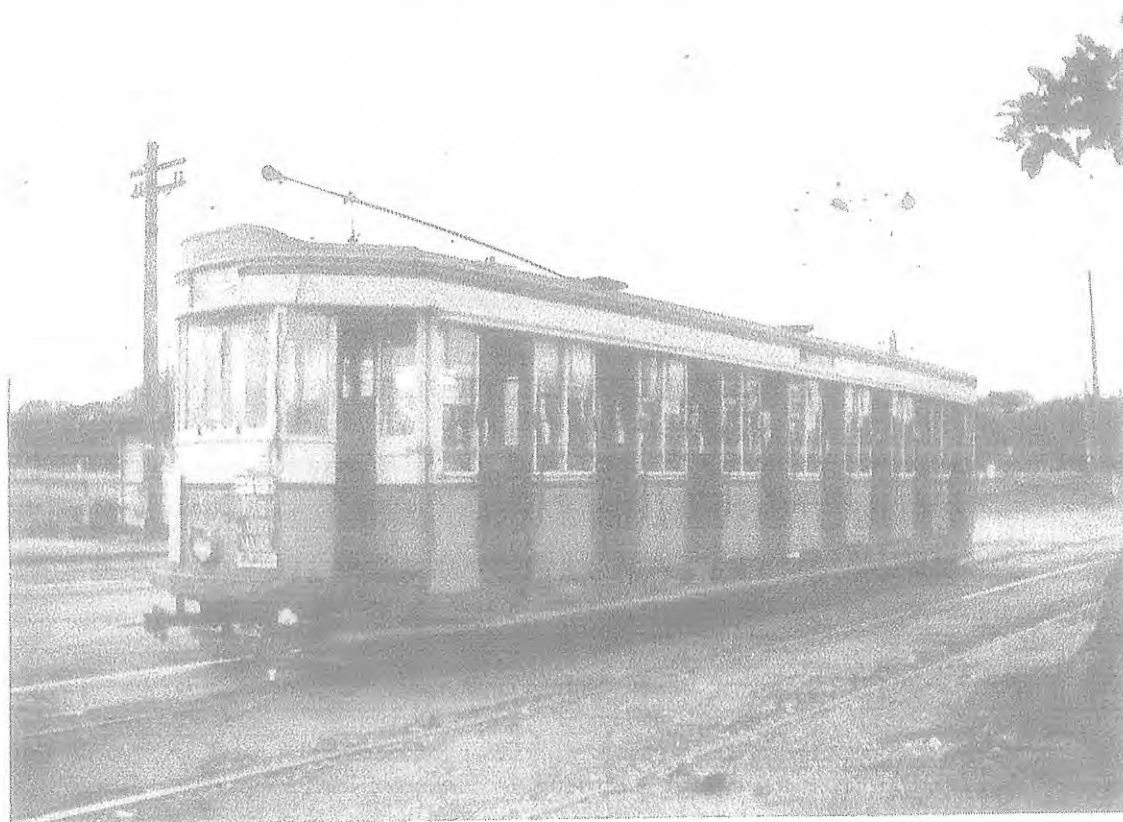
- a. Matchboard, tongue and groove side panels, pull down canvas door blinds, roof mounted built in front destination boxes. Cars 855 (6/20), 935 (4/19), 943 (4/19), 1007 (9/18), 1089 (6/20), 1170 (8/18), 1241 (11/19).
- b. Metal P type sides in wooden panel frame, O type front destination boxes mounted on apron, concertina folding doors. Cars 1372 (10/31), 1383 (12/45), 1451 (5/46).

Car 961 received roof mounted destination boxes and high sided LP type sides in open smoking compartments (6/22). Retained O classification until April 1947 when it became OP. Ultimo depot yard man regularly coupled No. 855 with 1089 and No. 1443 with 1451. Cars 935 and 943 were direct control non coupling cars. By December 1953 cars 855, 935, 943, 961 and 1372 were on scrap roads at Randwick Workshops; this group disposed of during 1954. Remainder withdrawn 1956-1958; last in service was No. 1451, withdrawn 9/10/58 and burnt 4/11/58.

**PRESERVED CAR:** OP 1089 to S.P.E.R. (2/74), body only; material available for complete restoration.

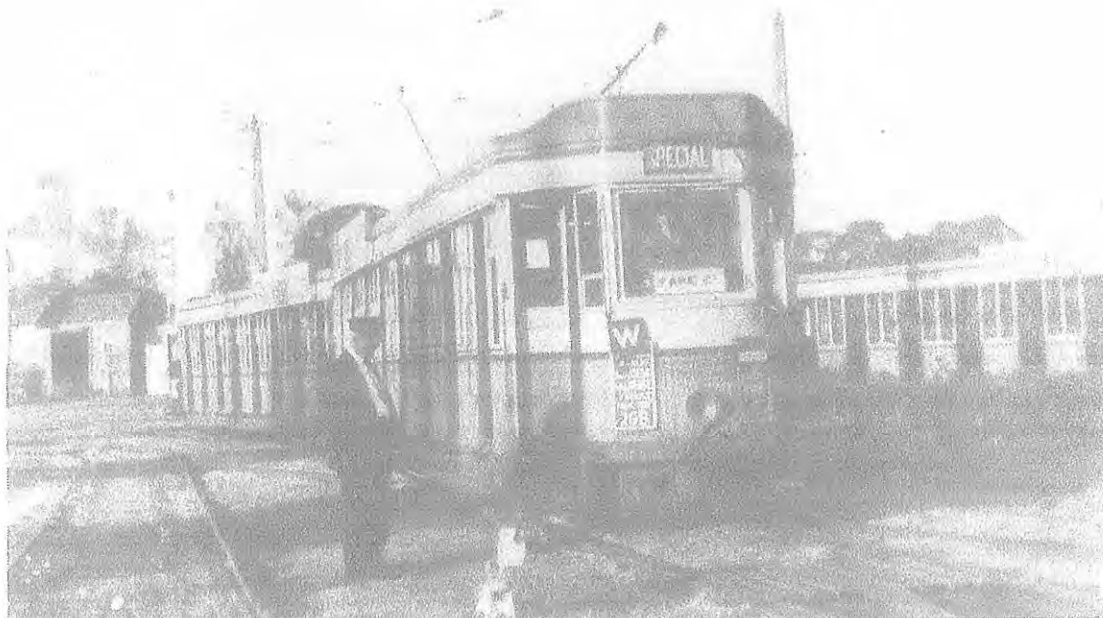


OP 1451, typical of the later conversion with standard O type destination boxes and lower, metal panelled sides at Ryde terminus in 1949.



The first P class car, No. 1480, at Kensington in 1949. Note the smaller fascia valence at the end, the unusual side frames, the counterbalanced windows and absence of Tomlinson couplers.





A coupled set of P cars negotiates the complex trackwork at Randwick Racecourse sidings. The number alone, No. 1682, is all there is to indicate that this car was the only one of its class built at Newcastle.

## P CLASS

Nos: 1480-1737

(Total: 258 cars)

<i>Type:</i>	Bogie enclosed cross bench car
<i>Built:</i>	Randwick Workshops, 1921-24 - 1480-1531
	Meadowbank Manufacturing Co., 1923-26 - 1532-1681
	1926 - 1683-1707
	Walsh Island Dockyard, Newcastle, 1926 - 1682
	Mort's Dock, Sydney, 1928-29 - 1708-1737
<i>Seating:</i>	80
<i>Trucks:</i>	Sydney No. 9
<i>Motor Rating:</i>	4 x 40 hp
<i>Weight:</i>	15.6 tons - Nos. 1480, 1481; 16.6 tons - remainder
<i>Length:</i>	45 ft 5 in

**PURPOSE OF CONSTRUCTION:** Service improvements, minor extensions, withdrawal of last C and cars, and G class from service.

**NOTES:** Products of Traffic Manager E. Doran's period, known as 'Doran's Glass-houses' when new. Design devised in 1916, all compartments enclosed but the concertina canvas doors and large windows provided "convertible" type body suitable for all weathers. This body style also used on 250 L, 1 N and 10 O car conversions (q.v.). All P class cars carried multiple unit control, but Nos. 1480 and 1481 were non-coupling; the remainder provided with Tomlinson M.U. type couplers which did not require separate jumper hoses and cables. Nos. 1480-1481 experimental cars on welded plate side chassis, and casement type metal frame window sashes where bottom half lowered into side panel below waist level synchronised with top sash by rack and pinion mechanism which lifted up behind top crown light. Fitted with O type link and pin couplers for emergencies. No. 1480 inspected 3/2/21, small fascia valence then fitted above front destination signs to ease 'wedding cake' appearance. No. 1480 entered traffic 16/9/21 with General

Electric equipment and 1481 on 6/12/21 with Westinghouse gear.

The first standard P car, No. 1482, entered service on 19/1/22. This group fitted with single piece frameless balanced drop windows; rivetted chassis made from strips and angles, large fascia valences over the front destination boxes as fitted to LP320 in 1920. The last P car in service was No. 1737 on 16/4/29. Randwick built car 1506 sent to Meadowbank as sample car (14/1/23) and returned to traffic on 22/8/23.

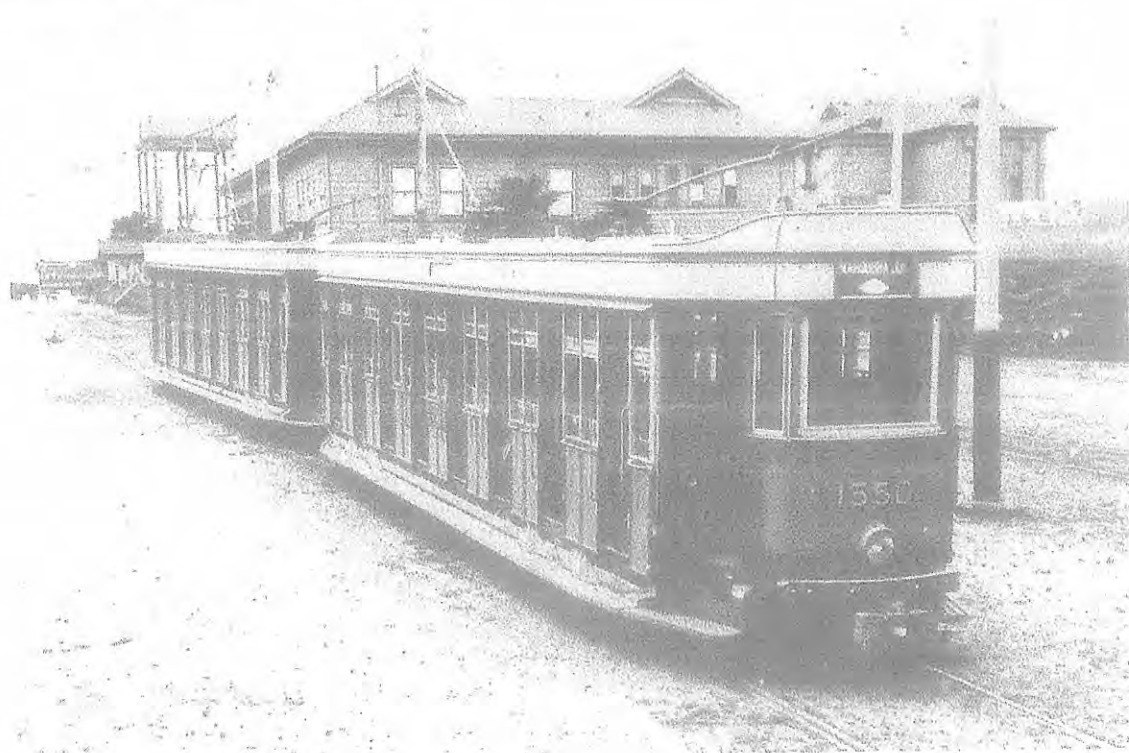
Neon illuminated side fascia ads (same height as roof) fitted to cars 1487, 1490, 1512, 1537, 1539, 1549, 1560, 1564, 1568, 1571, 1583, 1667, 1682, 1690, 1694, 1709 and 1732 from 1935 to 1937; fitted to Nos. 1560, 1564, 1597 and 1667 from 1939 to 1940. Small side roof ads internally illuminated, with plastic letters fitted to car 1677 (16/10/49); to Nos. 1490, 1545, 1556, 1583, 1597, 1600, 1606, 1631, 1675, 1678, 1699, 1700 and 1706 between 11/49 and 2/50. Some others followed. Replaced by larger external side signs projecting above car roof, illuminated by internal fluorescent tubes commencing with Nos. 1699 and 1723 in July 1954.

As P cars aged, bodies suffered longitudinal weakness. From June 1952 bodies strengthened by replacing side panels containing transverse bulkheads with solid metal sides to form a stiffening trunnion. Many fitted. After July 1954 P cars with side damage fitted with solid metal sides below all windows.

No. 1481 was withdrawn 29/6/51, No. 1480 on 16/8/53, both burnt 23/7/54. First P car burnt was No. 1485 (10/11/53) after accident at Haberfield 7/5/53. This class gradually withdrawn, except for smash victims, after closure of the Waverley depot in June 1959 and new timetables enabled all off peak Sydney services to be worked by saloon cars. Last regular use ceased on closure of Bondi and Bronte lines in February 1960. Last special operation with cars 1483 and 1497 on 19th February 1961.

**CONVERSIONS:** Car 1691 had corridor cut down centre in 1942, known as PR type. Nos. 1517, 1562, 1573 and 1582 received new type saloon body in 1949, known as PR1 type.

**PRESERVED CARS:** P 1700 to Seashore Trolley Museum in Maine, U.S.A.  
P 1497 to S.P.E.R.



Coupled P class cars in the pre-1933 colour scheme in Dowling Street depot yard.

## PR CLASS

Number: 1691

Type:	Bogie enclosed cross bench car with centre aisle
Converted:	Randwick Workshops, 1942, from P car (q.v.)
Seating:	66
Trucks:	Sydney No.9
Motor Rating:	4 x 40 hp
Weight:	16 tons
Length:	45 ft 5 ins

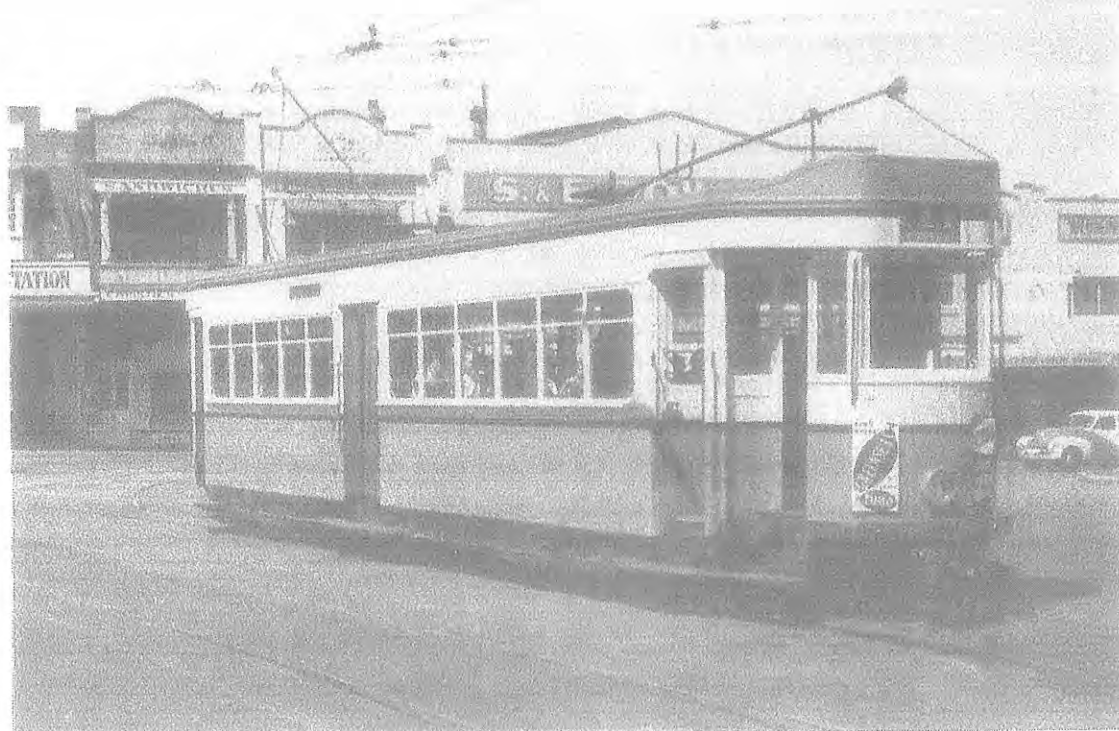
**PURPOSE OF CONVERSION:** Initially, reduction of number of footboard cross bench cars in service. When converted, to enable conductresses to be employed on cars other than R and R1 types.

**NOTES:** Conversion first investigated, costed and engineering planning undertaken in August 1934, anticipated cost then £500 (\$1,000) for initial car, £180 (\$360) per tram in batches of 25. Rebuilding entailed rebracing of bulkheads, the lowering of the floor ramp over the motors by redesigning the motor lead boxes, rebracing of cut seats, and new seat ends. Conversion carried out on car 1691 in 1942 at total cost of £657-6-3 (\$1314.62), conversion completed 30/10/42, press review 4/12/42, entered traffic from Waverley depot with 'brown out' lighting and glass splinter prevention wire and shields for air raids. No further conversions undertaken due to aisle width of 16 ins. compared with 23 ins. for R cars; while conductors continued to use footboards for fare collection.

Transferred to Tempe depot in March 1952; unlike Waverley service it received extensive use from this depot, even in coupled set operation. To Randwick Workshops in August 1953, noted being broken up in November 1953.



A rare internal view of PR 1691 showing the corridor cut through the cross seats and the bulkheads and also the longitudinal grab rails.



No. 1573, one of four P type cars extensively rebuilt to the PR1 type. These cars could still be run coupled in multiple unit with other M.U. control P class cars.

## PR1 CLASS

Numbers: 1517, 1562, 1573, 1582

(Total: 4 cars)

Type:	Bogie saloon car, front, centre and rear loading
Converted:	Randwick Workshops — 1949 (1517, 1573) Eveleigh Railway Workshops, Sydney — 1949 (1562, 1582) (converted from P type,(q.v.))
Seating:	52
Trucks:	Sydney No.9
Motor Rating:	4 x 40 hp
Weight:	17.6 tons
Length:	45 ft 5 in

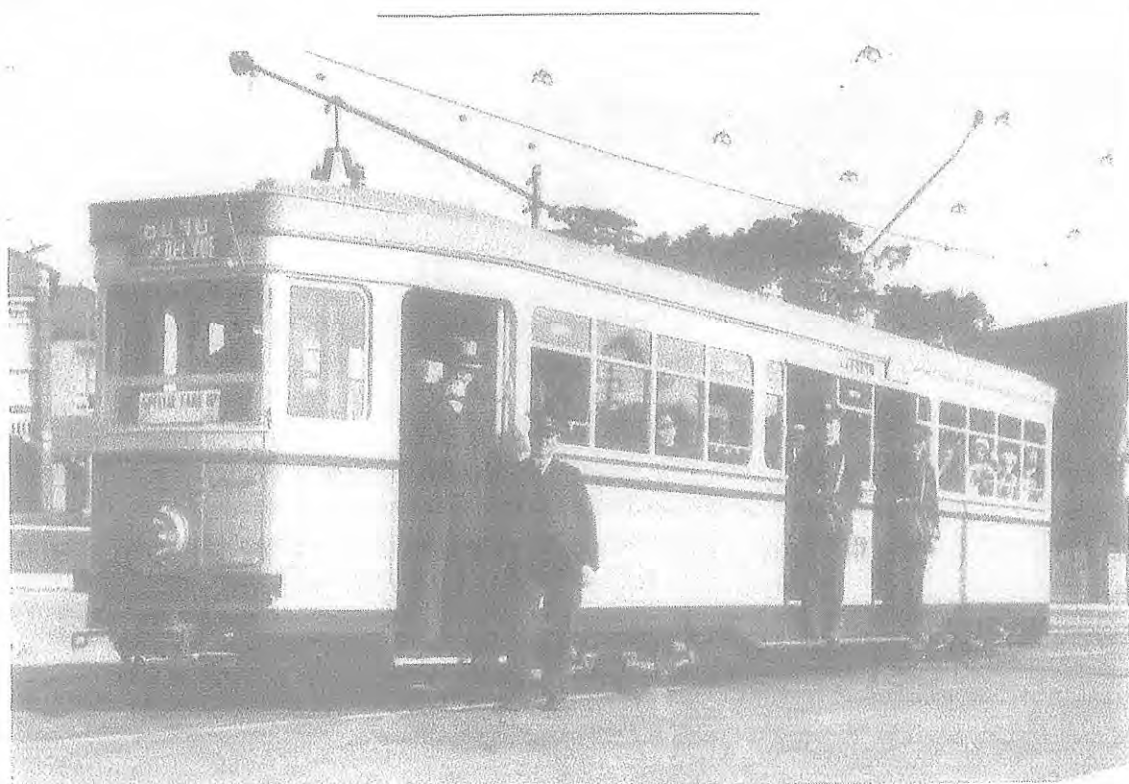
**PURPOSE OF CONVERSION:** To provide Sydney with additional modern saloon tramcars after World War II at a moderate cost.

**NOTES:** First car, No.1582 received from Eveleigh paint shops 27/4/49, official trial 9/5/49, entered public service on Quay to Alexandria and Quay to Matraville lines on 13/5/49. Cars 1517 and 1562 outshopped 21/7/49 and 1573 on 30/9/49. Rebuilt and remotored at cost of £3,725 each. Bogies, underframe, electrical gear, drivers cabins and roof of original retained, motors redesigned to enable floor hump to be removed. Between August 1949 and 1952 use mainly limited to Alexandria service. Housed at Dowling Street depot for entire life, used after 1952 on Robertson Road to Dowling Street depot staff 'Limerick' service and for towing disabled cars to Randwick Workshops. Nos. 1562 and 1582 used in coupled set on tour (1/12/52); the tour was completed in Nos.1582 and 1517 due to hot box on 1562. Car 1517 equipped with Metropolitan Vickers flexible (resilient) gears (7/52). All classed as stored after Easter traffic, April 1954. All four cars repainted 1955-56 and received small style external numerals. No further conversions carried out due to high conversion costs on vehicles then 25 years old. Fitted with off side loading prevention bars, not used. Bodies disposed; Nos.1582 and 1517 (12/58), No.



1573 in May 1959 and 1562 in January 1960. Car 1562 noted on scrap roads at Randwick in May 1959.

**PRESERVED CAR:** No.1573 used as playroom at Glenfield Special School, N.S.W. until 18/12/65 when body delivered to S.P.E.R. tramway museum, Loftus, and placed on former M. & M.T.B. ex W2 type bogies and driven into depot under its own power.



Brand new R car No.1739 in special introductory service on the Bellevue Hill line in October 1933. Driver's front windcreens were later fixed in the closed position when air operated wipers installed. The kinked trolley pole is unexplained!

## R CLASS

Nos: 1738-1932

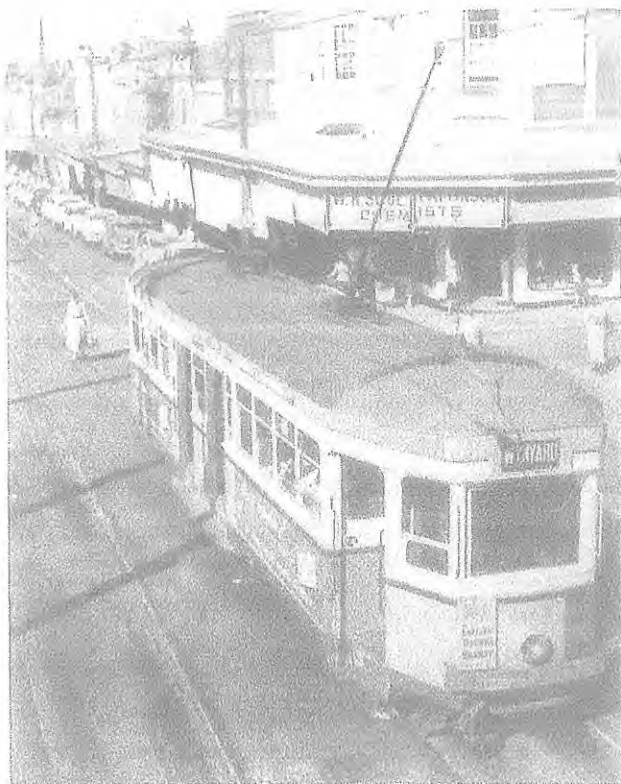
(Total: 195 cars)

Type:	Front, centre and rear loading, bogie dropcentre saloon, divided into three compartments.
Built:	Clyde Engineering Co., 1933-35
Seating:	48
Trucks:	Sydney No. 12, air brake cylinders mounted on bogie
Motors:	4 x 40 hp
Weight:	17.65 tons
Length:	47 ft 0 in

**PURPOSE OF CONSTRUCTION:** To give modern image to Sydney transport system at a period when new buses and trolley buses were being delivered. Replaced early cars on Bondi via Bellevue Hill, Watsons Bay, Quay to Railway, Glebe Point, Coogee-Waverley depot, Darling Street Wharf-Canterbury, Rosebery, North Sydney cross country and Sydney all night services.

**NOTES:** From August 1930, the Tramways Department was separated from Railway control to become the Metropolitan Transport Trust and Newcastle Transport Trust until April 1932 when the name was altered to N.S.W. Transport Department. In February 1933 operated as Department of Road Transport and Tramways. The Transport Trust initiated design of the R car based on design trends in Adelaide,





R car 1843 at the Chatswood Station terminus of the North Sydney lines in 1956.

Brisbane, Melbourne as well as overseas. Survey conducted in September 1932 on four alternatives:- coupling and non-coupling dropcentre cars with non-reversible wooden seats (£3,200, £2,600 each respectively), and coupling and non-coupling saloon cars with upholstered tip over seats (£3,400 and £2,800 each). Last type adopted as expected saving on overall costs compared with old J and K types on Watsons Bay service was £22,500 per annum. Prior to construction a wooden full size mock up car was constructed at Randwick Workshops with variation in roof fascia and window design when compared with the final type.

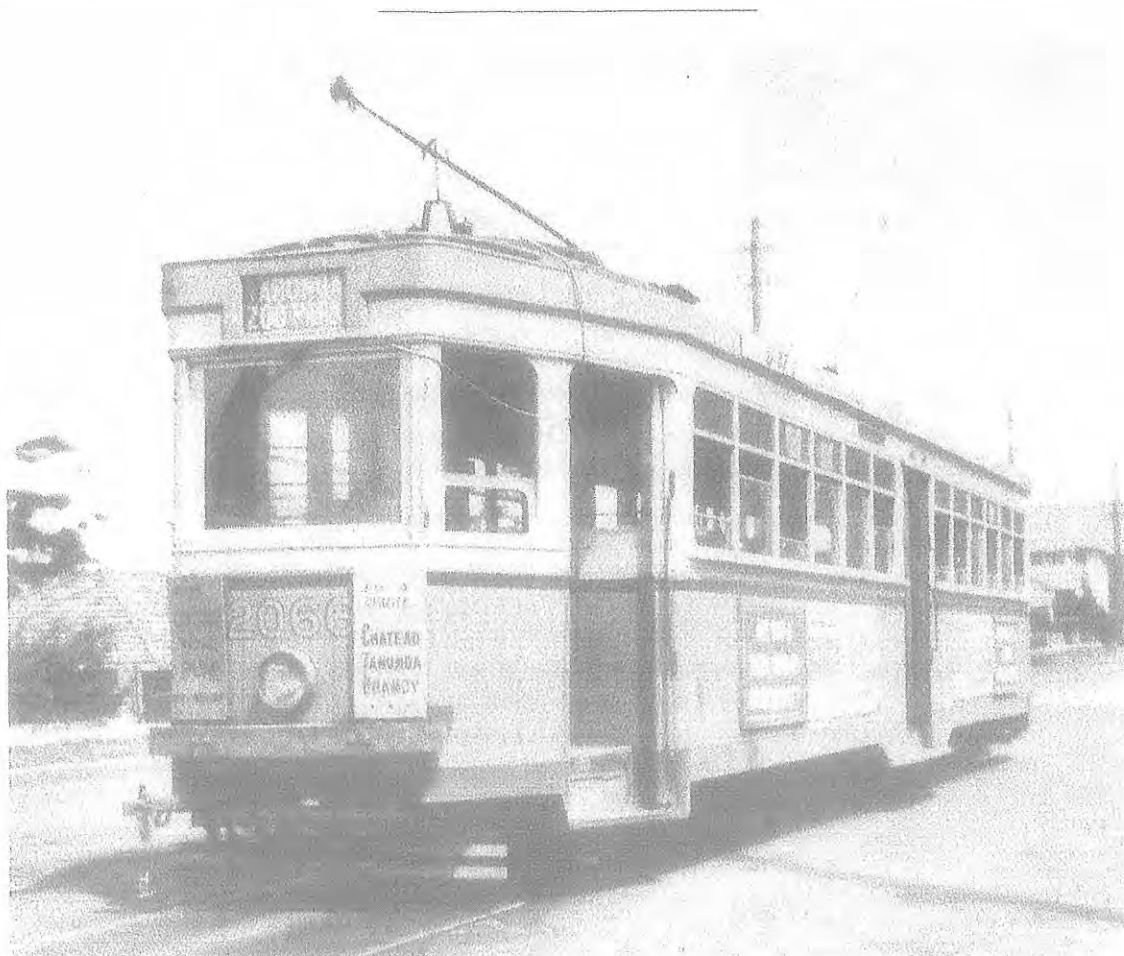
First car, No. 1738, received on 24/9/33, officially unveiled at Randwick (19/9/33) and placed on display at Bridge Street yard. Car 1739 commenced trial display runs to Vaucluse on 4/10/33, later in trial public service with No. 1740 to Vaucluse, Bondi via Bellevue and Gladesville. Class leader 1738 entered service 3/11/33. Last R car, No. 1932, entered service on 6/6/35. Last five cars of the initial order, Nos. 1933-37, converted to R1 design prior to completion (q.v.). The R type introduced the green and cream colour scheme to Sydney. Introduced to the following routes from dates shown, only first and last named became fully R (or R1) worked:- Watsons Bay (10/33), Bondi via Bellevue Hill (6/34), North Sydney (9/34), Rosebery (1/36), Glebe Point (3/36), Quay to Railway (1/37), Coogee to Waverley (8/39) and Darling Street Wharf-Canterbury (6/40). Cars 1745, 1748 and 1917 fitted with battery operated dewirement indicators in 1948 (see O class car notes).

R 1875 ran into harbour off end of tracks at Taronga Zoo terminal (15/1/42), taken by floating crane, slung on a hook during the journey, to Fort Macquarie (18/1/42), placed on temporary bogies and hauled to Randwick to be rebuilt and returned to North Sydney. R 1890 repeated the runaway on 20/7/52, was taken by barge to Fort Macquarie (23/7/52), carried to Randwick on motor road vehicle. Returned to service (3/54) with two centre bulkheads removed, similar to R1, did not return to North Sydney.

All R cars fitted with off side loading prevention bars on end doorways not used. Not capable of electric coupled operation but R types transferred from Fort Macquarie depot on closure (23/10/55) in coupled motor-trailer sets. Car 1925 painted red and gold for 1954 Royal Tour with small roof mounted crown to enable underground working to Wynyard. Carried this colour scheme until 10/55.

Most R cars fitted with R1 type self lapping air brake valves 1954-58. North Sydney R cars transferred to Sydney after closure in June 1958, but mainly retained in store; remainder withdrawn from regular service after George Street lines closure (23/11/58). Returned to service (28/6/59) when P cars limited to peak services. Withdrawn from regular service after closure of Watsons Bay line in July 1960. No. 1781 first car sold (2/59), last car sold being No. 1863 on 12th May 1961.

**PRESERVED CARS:** R 1738 to M.A.A.S.; R 1740 to S.P.E.R. R car bodies preserved privately:- 1842, 1845 and 1848.



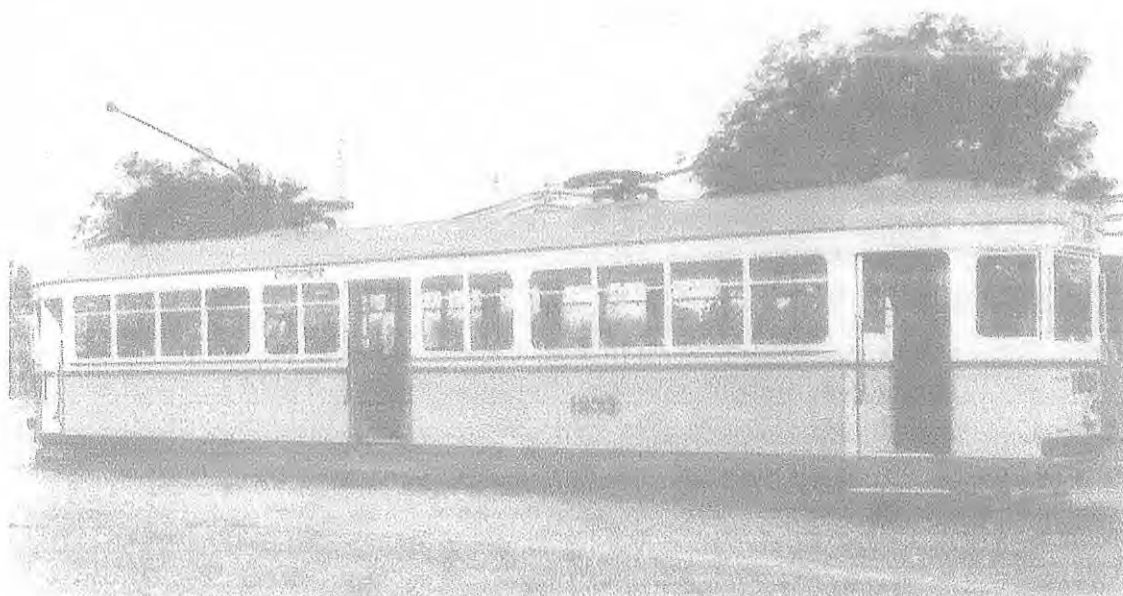
R1 car No. 2066 at the Lane Cove terminus in 1957. The post war cars were in service for less than 12 years, some as little as eight years.

## R1 CLASS

Numbers: 1933-2087

(Total: 155 cars)

<i>Type:</i>	Front, centre and rear loading drop centre bogie saloon car, no central body bulkheads.
<i>Built:</i>	Clyde Engineering Co. - 1935-36 (1933-1987) Commonwealth Engineering Co. - 1950-53 (1988-2087)
<i>Seating:</i>	56
<i>Trucks:</i>	Sydney No.12 - 1933-1937, air brake cylinders on bogies Sydney No.13 - 1938-2087, air brake cylinder mounted under car body.
<i>Motors:</i>	4 x 40 hp
<i>Weight:</i>	17.58 tons
<i>Length:</i>	47 ft 0 in



R1 class car (modified R type) No. 1933. The different window spacings from the later R1 cars are quite noticeable in this official photo

**PURPOSE OF CONSTRUCTION:** See R class details; also enabled extended use of corridor cars on routes served by N and E types 1936-40. Post war batch enabled withdrawal of N, LP and K tramcars.

**NOTES:** Last five cars in R class order altered as experiment to R1 design using R car jigs and patterns as much as possible. This eliminated two centre doors, two centre internal bulkheads, and enabled seating for 56 to be provided on upholstered benches, but seats for 24 could not be reversed. Car 1933 entered traffic on the King Street line on 16/5/35. Order for 50 cars of this type placed with altered window spacing and shorter drop centre section which allowed room for chassis mounted air brake cylinder. Nos. 1933-7 carried off side loading prevention bars, the remainder not fitted with these devices. Nos. 1937 to 2087 furnished with self lapping air brake valves when built. Regular working of pre World War II R1 type cars was on the Watsons Bay line, and all were housed in Rushcutters Bay depot from 1936.

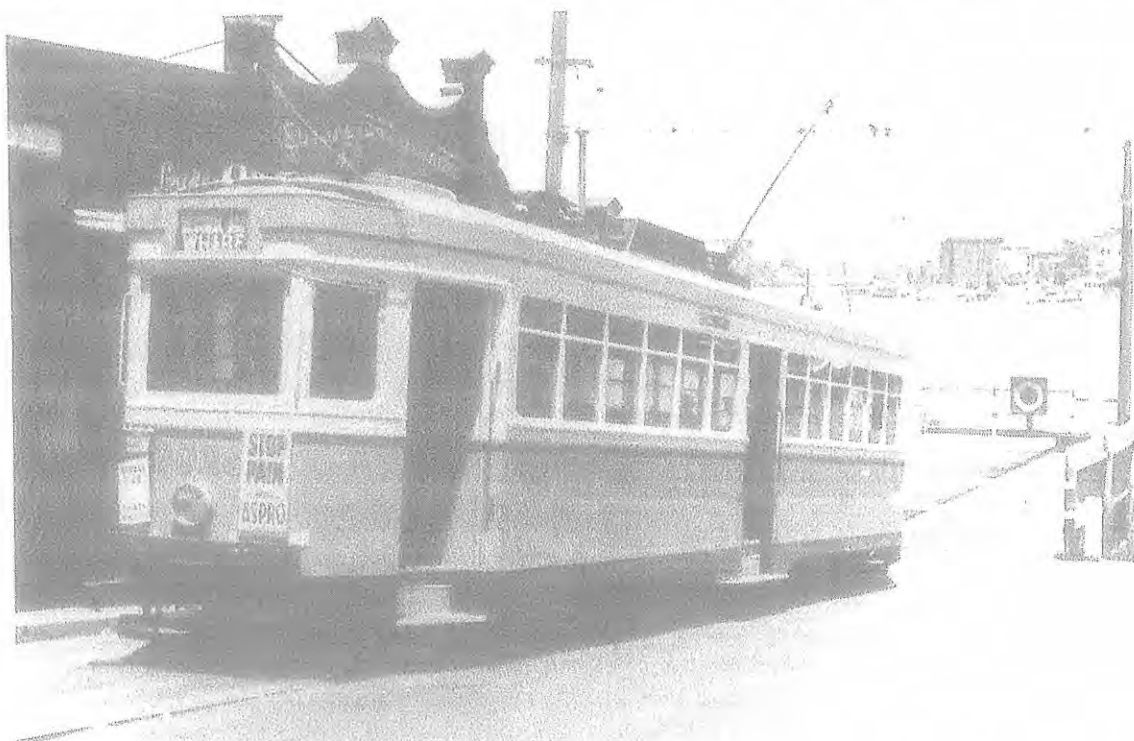
Cars 1941 and 1945 carried side painted external advertisements between 1942 and 1950. These were sponsored by the Labor Commonwealth Government and displayed, in turn, four campaigns:- 'War Loan Investment', 'Buy War Saving Certificates', 'Victory Bonds' and 'Save to Keep Prices Down'. The 'Victory Bonds' appeared as the fortunes of World War II changed in October 1944. These two cars traversed western suburbs lines in off peak and Saturday services during late war years. Signs removed in 1950 after Liberal-Country Party government took control in Canberra. Car 1974 painted in various shades of blue for R.A.A.F. recruiting campaign, entered traffic after ceremony in St. James Road (27/3/52). During early campaign stages car fitted with external fluorescent tubes mounted under side sill canopies, later removed. Noted in Randwick yards (11/52) to be repainted green and cream. In December 1953 cars 1992 and 2019 received trial paint schemes for 1954 Royal Tour. On 1992:- half milky-white with blue linings, half old ivory and blue. On 2019:- half red and yellow with gold lining and under-frame, half red and white. Following adopted:- Cars 1992 and 1951 - ivory with gold and blue lining; Car 2019 - old gold and red with gold lining. All carried large roof mounted internally illuminated crowns during Royal Tour period in February 1954. External side adverts fitted to R and R1 cars progressively after first week in July 1953; removed as contracts expired 1959-61, some continued until last day of operation.

First post war tram, No.1988, delivered 5/9/50; last car, 2087 on 17/9/53. Last 150 cars in order of 250 cancelled after many parts were delivered. Post war batch differed from pre war cars in some minor details:- composite sheet ceiling lining in place of pre war tongue and groove strips, internal rails stainless steel tube in place of baked enamel, altered kickplates on steps. Distributed to Ultimo, Dowling Street, Rozelle, Tempe, Newtown, Waverley and North Sydney depots. Pre war R1 cars attached to Rushcutters Bay until trams 1933 and 1934 transferred to North Sydney (8/51) and No.1987 to Tempe depot. Post war cars spread around Sydney and North Sydney workings with emphasis on off peak workings to western and southern suburbs after 1952.

Car 2018 collided with a truck at Crystal Street, Petersham during evening of first day in traffic (9/5/52); exploding petrol gutted tramcar, no injuries. Towed to Randwick Workshops, work commenced on rebuilding bogie components, but project halted and car burnt 26/3/54. R1 type 2000 over-ran Taronga Zoo terminal ash drag into harbour (see R car notes) on 22/1/58; stripped of useful parts in situ such as windows, bumpers, headlights, seats and boarded up. Taken to Randwick Workshops (28/1/58) and scrapped.

No.1958 fitted with Brisbane Tramways' resilient wheel bogies as trial, limited to Quay-Railway service out of Fort Macquarie depot, entered service on 14/4/50; continued in intermittent service until 13/9/50. Car 1974 fitted with English Electric *Silentbloc* resilient equipment from 18/1/54 to 25/1/57. Dynamic braking trials were conducted on car 1999 (1/52) with resistors on temporary shelves. Permanent equipment fitted to No. 2029 for Neutral Bay working, trials to Watsons Bay (3/10/52); Neutral Bay trial 4/11/52, in service on 21/11/52. It displaced K and E class cars on regular operation (q.v.). Equipment removed from 2029 in June 1956 after Neutral Bay line closure.

Between Rushcutters Bay depot closure in July 1960 and the final Sydney closure in February 1961, the R1 type worked all regular services, out of Dowling Street depot. Last batch of cars from Hunter Street, Sydney at 2.48 pm on Saturday



R1 car 2029 at Neutral Bay Wharf in 1952. The extra resistances for the dynamic braking were fitted in the special housing on the tram's roof.





Sydney tramcar on Brisbane trucks! R1 1958 at Circular Quay during trial operation on a borrowed pair of resilient wheel bogies from the Brisbane Tramways in April 1950.

15th February 1961 comprised Nos.1961, 2035 and 1995; last from Railway Square were Nos.1963 and 2083. Last car from Maroubra was No.2083 and the last from La Perouse were Nos.1963, 1961, 2035 and 1995 at 3.45 pm. Car 1995 was the last to enter Randwick Workshops yard at 4.26 pm, the last tramcar to leave Sydney streets.

**PRESERVED CARS:** R1 1979 used as a works shunter at Randwick until late 1971, to S.P.E.R. on 17th August 1972. R1 1971 preserved privately, complete. Body only of R1 1948 at Colo Vale (Southern Highlands' Transport Museum N.S.W.); body only of R1 1933 retained at Randwick as First Aid room.

## PRISON CAR

Number: 52S, then 948

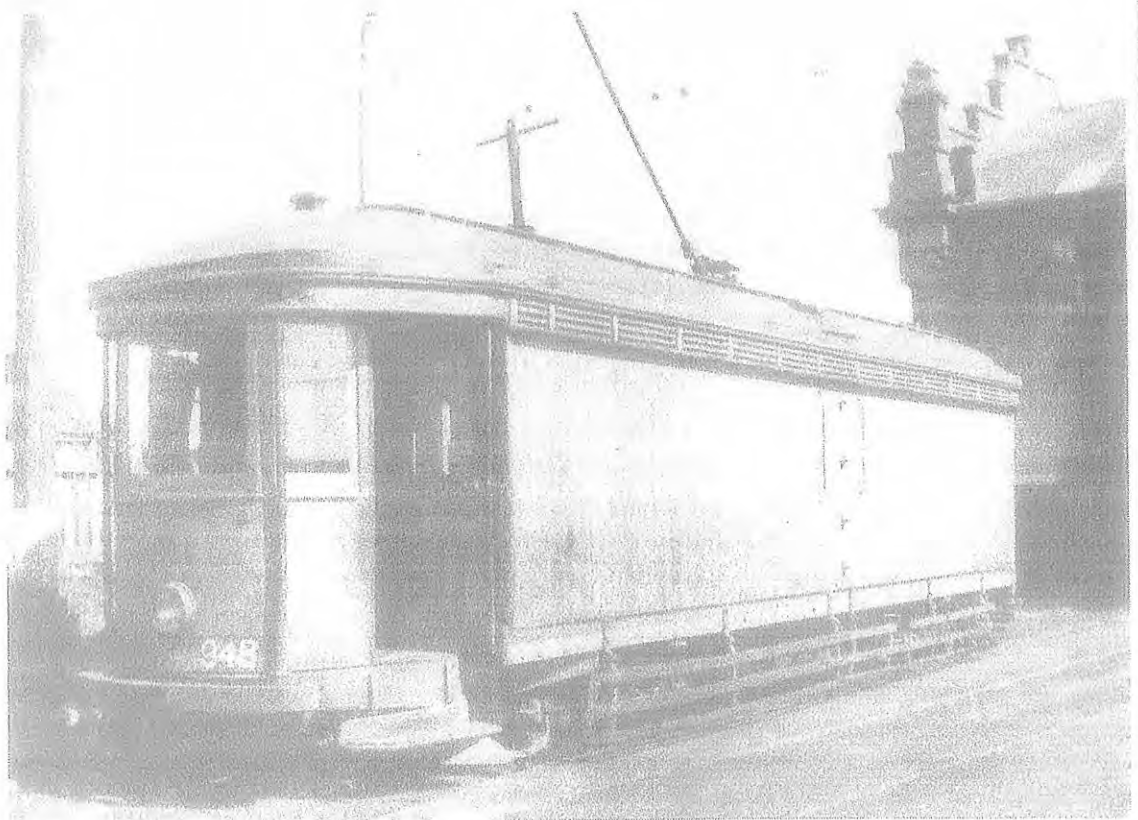
**Type:** Maximum traction bogie prison car  
**Built:** Randwick Workshops, 1909  
**Trucks:** Brill 22E  
**Motors:** 2 x 48 hp  
**Weight:** 15.25 tons  
**Length:** 38 ft 4 in

**PURPOSE OF CONSTRUCTION:** To provide transport for prisoners between Darlinghurst Court House and Long Bay Gaol.

**VOTES:** Drawings for a four wheel prison car prepared in 1907 with four cells seating 32, length 27 ft 7 in. Not constructed. Bogie version built, possibly using parts of missing N car 683, in September 1909. Allocated number 52S but given passenger number 948, possibly due to its revenue earning capacity. Fitted with six cells, seating 48, with side corridor. Cells were windowless, six windows being fitted to the corridor wall.

Enabled prisoners to be transferred from the Courts to the gaol shielded from public curiosity as sidings were constructed into special enclosed terminals. Attached to Waverley depot. Withdrawn 12/50 after periods during 1949-50 of





Prison car, No. 948, in Waverley depot yard. The other side of the tram had six windows which opened onto a side corridor; the side in view was blank against the six cells.

being out of service due to deteriorating underframe condition. Carried drab olive grey and fawn colour scheme until withdrawn. Preserved; No. 948 to S.P.E.R.



Sydney's last new passenger tram to enter service was R1 car 2087. Our photo shows the tram entering Milson's Point station on its first day of service, 20th September 1953.

# WHEN "HORSE POWER" MEANT "THE HORSE"

By K. McCarthy

The anniversary articles presented in this magazine from time to time have continued to be favourably received by readers. These occasions have been used to present material on topics which have not, at that stage, been fully researched; readers have usually responded by passing on additional information to be used at a later date when a more detailed treatment is published.

The 1981-82 period gives the opportunity to record some horse tramway anniversaries:-

- + 120 years since the opening of the Pitt Street horse tramway in Sydney, the first street tramway in Australia.
- + 50 years since the closure of the Moonta and

Gawler tramways in South Australia.

+ 25 years since the closure of the Victor Harbour tramway.

+ 40 years since the closure of the freight working on the Port Broughton tramway.

Some additional information has been obtained on the Moonta undertaking since its treatment in these pages during October 1980, while other new data and photographs have come to hand on other horse tramway workings. This new material is presented here, not as definitive material, but as an attempt to pass on to readers new aspects of the subject.

## THE PITT STREET HORSE TRAMWAY. SYDNEY N.S.W.

### Early Development of Sydney Public Transport.

It is believed that the first stand for public coaches in Sydney was established at King's Wharf during 1830. Later, coaches with glass windows, as seen in London at the time of the Coronation of George IV (July 1821) were introduced for public hire in Sydney. These vehicles continued in use in Sydney for years after vanishing from London streets.<sup>1</sup>

In 1845 Mr. J. Howard introduced a line of omnibuses which operated along George Street from Circular Quay to what is now Railway Square. Howard charged 6d. (5c) for the through bus journey but this low fare caused protests from the cab drivers as the omnibuses took away much of their business.

A meeting held in the old Metropole Hotel during the late 1850's investigated alternative means of street transport and the Pitt Street horse tramway emerged from this gathering.

At this stage the N.S.W. railway system only extended as far as Campbelltown from Sydney and West Maitland from Newcastle, a distance of 73 miles. By 1861 the population of Sydney had reached 56,470 in the city area with an additional 36,732 in the suburbs.<sup>2</sup> Plans at that stage were being formulated for trunk main line railways, but branch lines as well as extensions beyond the key country centres were planned to be of light weight construction worked by horse traction. These light

railway proposals were opposed by John Whitton, the Engineer-in-Chief from 1857, with such vigour that all construction, with the exception of the Blacktown to Windsor-Richmond line, opened in 1864, were built to take standard locomotives and rollingstock.<sup>3</sup>

**Pitt Street Tramway Proposals.** The Robertson-Cowper Ministry was impressed with the horse tramway proposal, especially as a standard gauge (4'8½" gauge) track between the Sydney railway terminal at Redfern and the wharves at Circular Quay would possibly be a suitable, but much cheaper alternative, to extending the steam railway further into the city area. Mr. Robertson introduced the Pitt Street Tramway Bill into the N.S.W. Colonial Parliament on 14 September 1859 and the proposal was referred to a Select Committee for consideration on 29 September.<sup>4</sup> This committee reported on 25 May 1860 that the proposed tramway would lessen the cost of the conveying railway rolling stock and goods traffic between Quay and the railway terminus and would also facilitate the passenger traffic.

Residents and businessmen in Pitt Street did not want half of their street occupied by a tramway, while the Sydney Municipal Council feared that the tramway construction would destroy £150,000<sup>5</sup> worth of municipal property in road damage as well

as drainage and water main diversions. John Sutherland, the Mayor of Sydney and M.L.A. for Paddington (later to become Minister for Works) complained that the tramway would result in government interference with the civic control of the streets, while other opposition to the tramway scheme was based on the expected traffic congestion due to Pitt St. being no wider than 34 feet.

As the city corporation opposed the scheme, the government was forced to enact a Bill to carry out the project. The Select Committee recommended that the government should be responsible for keeping the road in repair around the tracks if the tramway was constructed while the method of traction should be restricted to horses. This committee felt that the tramway would "afford great accommodation for the conveyance of produce as well as for passengers who will probably be taken up and put down at parts of the city that will be most convenient for their respective places of business".<sup>6</sup> The Successful Bill. The Minister for Works, Mr. W. Arnold, introduced the tramway bill during February 1861. During the second reading, he argued that the scheme would offer a commodious means of conveyance for passengers and would be carried down the centre of the street leaving 16 feet on either side between the rails and kerbing. The motion was passed 35 to 16 by the Legislative Assembly and then sent to the Legislative Council. In this Upper House the proposal received a hostile reception but passed the second reading 11 to 3.

After being debated during several sessions the Bill lapsed but was passed in the following session after being restored to the business paper. The Act received the governor's assent on 3 May 1861.<sup>7</sup> C.F. Train's System Accepted. Captain Martindale R.E. was the Commissioner for Railways in N.S.W. from 22 July 1857 until the appointment of John Rae on 15 January 1861. Martindale returned to Britain where he received a posting in Ireland, a transfer which did not particularly please him as his specialty was fortification design and construction. He was originally transferred to N.S.W. to design and advise on fortification matters.<sup>8</sup> Martindale recommended C.F. Train's tramway<sup>9</sup> system for the Pitt Street venture and Train's tender for the supply of two tramcars, rails and fastenings was accepted in April 1861, before the Bill received the governor's assent!<sup>10</sup>

"The 'Sydney Morning Herald' for 20 April 1861 reported that the Bill for the Pitt St. tramway had been passed in both houses of parliament. The point was made that some concern was still held for the proposal to construct the track down such a narrow thoroughfare as Pitt Street, but as the trips would be few in number, and the cars drawn by horses at a slow rate, little inconvenience would occur.

This report stated that as most of the wool exported from Sydney was sold and placed on board ships at Circular Quay the tramway would be of great value in carrying produce to the place of shipment.

The Municipal Council had opposed all stages of the Tramway Bill, but the Commissioner for Railways accepted responsibility for interference to sewers and water pipes, would maintain the roadway between the rails and would be liable for injury sustained.

Material Ordered from England. Reports of late May 1861 still expected several more weeks of delay before tramway construction could commence.<sup>11</sup> By that stage the two tramcars and rails ordered from England had not arrived. These rails were of "the most recent improvement; the upper and lower sides are alike and can be reversed when desirable; in the one case the raised portion of the rail meets the edge and the flange of the wheel and in the other it fits into a groove prepared for it in the timber supports.

"The rails are laid on longitudinal logs which rest upon transverse sleepers placed at short intervals, the rails being secured in their places by spikes driven through the logs and clenched at the bottom of the sleepers.

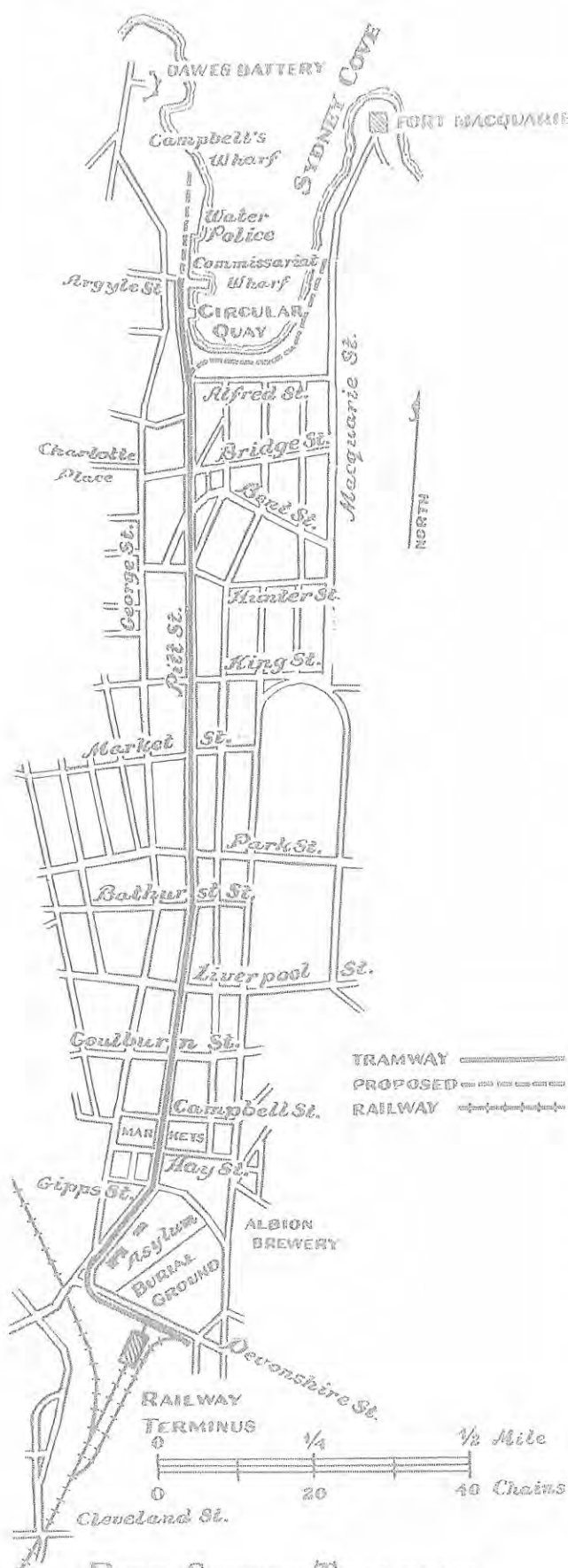
"The elevation of the rails above the level of the roadway would appear to be unavoidable but the height of this elevation will be only an inch and a half. There must necessarily be some inconvenience attending the construction of the tramway in so narrow a street but these are likely to be compensated by the advantage of having the railway carried through the heart of the city to the spot where most of the foreign vessels receive their cargoes."

The report concluded "As there are only three trains starting from and three arriving at Sydney (terminal) after ten o'clock in the morning, there is no reason to apprehend much danger of collision to traffic from the passing of a short train through Pitt Street only six times a day".

Arrival of the Tramway Material from England. The two tramcars and the permanent way material arrived on the sailing ship "Marcianus", a 914 tons vessel of the James Baines and Coy. Blackball Line. This ship reached Sydney on Friday 26 July under the command of Captain McGill with ten passengers. Served by a crew of 26, the vessel left Liverpool on 26 April 1861, stood off in the Mersey River on the following day and sailed on 28 April. The equator was crossed on the 23 May and the meridian of the Cape of Good Hope reached on 20 June.<sup>12</sup>

During June the ship experienced a rough passage. The foremast was sprung on 9 June and the cross jack yard carried away. A violent gale was





### PITT STREET TRAMWAY

1861-1866  
1861-1866

experienced on 11 June, some of the bulwarks were lost and the long boat shifted by seas breaking on board.

The ship carried 15 railway waggons, 84 wheel sets, 2 tramcars, 895 rails, 974 plates, 3683 brackets, 21 bags of spikes and 184 packages for the Railway Commissioners. A more detailed railway department return indicates that the ship carried 2 brake vans and 7 horse boxes constructed by Wright and Sons, 7 carriage trucks from Ashbury and Sons plant as well as the 2 tramcars.<sup>13</sup>

A press report of 19 August 1861<sup>14</sup> stated that all the carriages and brake vans being landed from ships from London and Liverpool were in a damaged condition. Although the carriages were secured with tarpaulins and packed in double cases the water from the rough passage had penetrated the vehicles and rotted the cushions. These damaged cars were delivered on the "Resolute", "Marcianus", "Bard of Avon" and "Nagasaki". Although this damage was covered by insurance, the vehicles would have to be repaired at Redfern terminus resulting in delays in entering service. The report concluded that the cost of transporting this rolling stock from England amounted to more than the construction cost.

This was approximately correct as far as the tramcars were concerned. The £521 construction cost increased to £906-3s-3d landed in Sydney. Freight amounted to £323-1s-7d, insurance £20-5s-0d, English and colonial charges £14-16s-8d.<sup>15</sup>

A later press statement felt that these additional charges could be saved and the additional work caused by sea damaged avoided if rolling stock was built in the colony.

Trouble on the "Marcianus". The rough passage was not the only problem experienced on the "Marcianus" during the passage. The "worst possible feeling" existed between the officers and men. This ill feeling resulted in assaults and on arrival in Sydney the captain and several officers were brought before the Sydney Water Police Court on assault complaints.<sup>16</sup> While moored at Pott's Wharf in Sydney Harbour on Friday 2 August 1861, seaman Kennedy struck second officer Brown with a capstan bar. Brown was immediately taken to the Sydney infirmary, but died two hours later. At the inquest held on Monday 5 August, Kennedy claimed that Brown had called him the "son of a whore" while unloading bags of salt in the hold.<sup>17</sup>

The murder trial was heard on Wednesday 30 September in the Central Criminal Court. Seaman Jacob Gibson from Norway stated that six men were working in the hold at 11am when George Kennedy struck Edwin Brown. Gibson stated that he had not heard the words at the time of the deed but Brown had abused Kennedy during the voyage

using such language as "son of a whore" and "son of a bitch". Gibson said that he would not have thought that the blow would have caused "so much mischief as it did".

Seaman William Brown submitted that he had heard officer Brown call Kennedy a "son of a whore" in the hold, to which Kennedy had replied that he was the son of a decent woman.

After hearing evidence from medical practitioner Edwin Egan, Wardsman Patrick Dowling, Police Inspector Henry Carr and Mr. Ellis, the legal representative for the prisoner, the judge instructed the jury that "by law all homicide was presumed to be murder and cost upon the person committing the homicide the onus of reducing it to manslaughter".

After an hour's retirement the jury found a verdict of "guilty of manslaughter." The prisoner was then sentenced to seven years hard labour on the roads or other public places.<sup>18</sup>

**Tender Accepted for Constructing the Tramway.** During July 1861 tenders closing at noon on Tuesday 13 August, were called for the construction of the Pitt Street tramway.<sup>19</sup> The Minister for Works considered these tenders on Thursday 15 August and awarded the job to Mr. Mark Faviell for the quoted price of just under £1,500.<sup>20</sup> Two months were allowed for completion and as a considerable portion of the material had already arrived it was expected that construction could commence immediately.

**Description of the Trackwork.** Just after the announcement of the award of the track construction contract further details of the tramway appeared in the press. The track materials, which were part of an indent dated 14 June 1860, were submitted to English tenders. George Francis Train was the successful tenderer.<sup>21</sup>

His step rail consisted of an iron plate, 5 inches wide and 1 inch in depth, with a step 1 ½ inches wide and ½ inch deep along two of the four edges, diagonally opposite each other, so that the plate could be reversed and inverted for further wear.

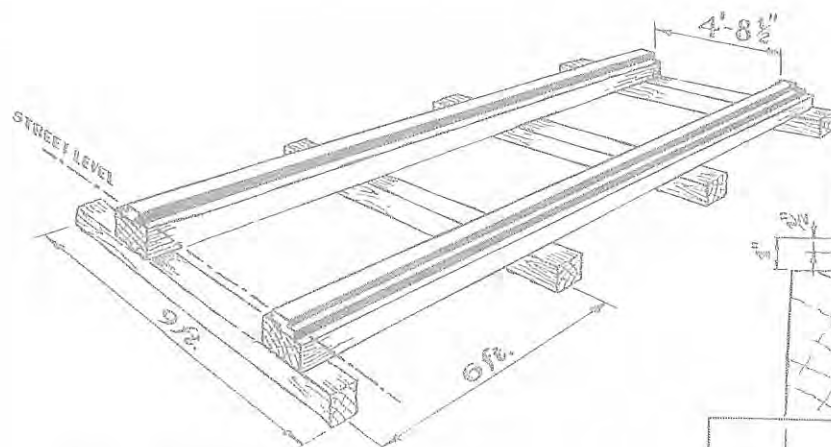
"It was first understood, and probably intended, that the rails should be laid so that the flanges of the wheels should run where there is a fall of half an inch in the rail; it appears, however, from the sections (drawings) of the tramway that the rails are to be turned and the flanges (will) traverse the inner extremities of the rails".<sup>22</sup>

This action converted the "step rail" to a normal "edge rail". This action was carried out to enable coarse flanged railway waggons to ride on the wheel treads rather than on their coarse flanges which would have been necessary had the rail been laid as G.F. Train's specifications intended.

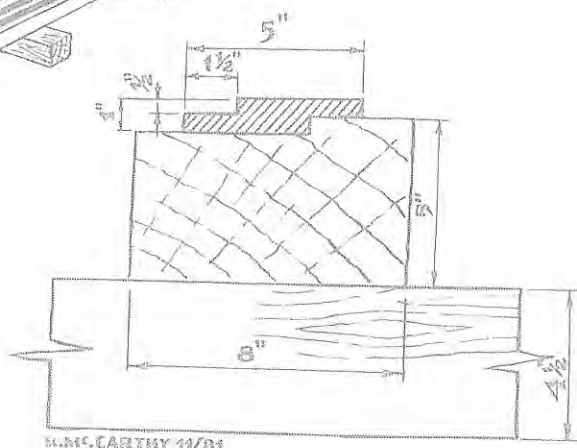
A contemporary report stated "The disturbance to the roadway will be that inside the rails where there will be a fall of an inch and one outside of half an inch". The rails were supplied in 24 feet lengths and weighed 50 lbs. to the yard.

The track in the final specifications was supported on transverse 4½" x 4½" ironbark sleepers, 9 feet long, spaced at 6 feet intervals, Longitudinal 8" x 5" ironbark baulks were fixed on top of these cross sleepers to carry the rails which were held down with bolts and spikes. Stone pitching was the recommended material for the road formation along the track but as this would have added considerably to the cost, ordinary road metal was used on the Pitt Street tramway.

**Description of the Route.** Two major curves were located on the route, one near the old Haymarket (located near the Pitt and Hay Streets corner) and the other at the Benevolent Asylum (situated at



PITT STREET TRAM TRACK  
SUGGESTED APPEARANCE



W. MC CARTHY 11/81





what is now the corner of Railway Square and the western end entrance of the Devonshire Street subway). Except for the grade of 1 in 30 at Brickfield Hill, the remainder of the route was reasonably level.

To avoid a cutting at the entrance to the Sydney railway terminal yard the tramway track was constructed on the same level as the station platform where the cars could await the arrival of the trains. On leaving the terminal yard the track was positioned to cross the triangular street island in front of the asylum from where it proceeded northwards along the centre of Pitt Street to the western side of Circular Quay at the Commissariat Stores at Argyle Street.

A later northwards extension of the tramway to Campbell's Wharf was planned near Dawes Point and another branch line around Sydney Cove to the wool stores at the eastern side of the Quay was also envisaged. The tramway proposals stated that passengers as well as goods would be carried, but the press pointed out that the construction of a goods shed at the Quay was not planned at that stage.

**Details of the Rolling Stock.** The "Sydney Morning Herald" for 21 August 1861 reported that the two imported tramcars were similar to the vehicles adopted by Mr. Train on his English street railways. These cars were of light weight construction and capable of carrying 60 passengers each. A later report expanded on these details and described the "comfortable cushioned seats along either side" of the interior saloon while outside "along the centre of the roof there is a double row of seats constructed with every regard to convenience, and (are) easily ascended by steps (ladders) on each side of the

doors". A communication cord attached to a bell at either end was fitted inside the car to indicate requested stopping places to the driver.

The article commented that this cord may be later removed as it was the intention of the operators to nominate stopping places rather than have the cars stop at every passenger's door.

**Track Construction.** The first track excavation commenced on Monday 16 September 1861 at the corner of Bathurst and Pitt Streets.<sup>23</sup> The contractor, Mr. Mark Faviell, planned to continue construction at that time towards the Quay while he expected the project to be completed in seven weeks. Only a small portion of the street would be excavated at the one time and the work would be fenced and protected by lanterns at night time.

By mid October 1861 two additional track gangs were at work on the tramway construction.<sup>24</sup> The second group was working from Hunter Street while the third was involved near the present Railway Square. Track was being extended in both direction these two locations as well as from the original Bathurst Street excavation.

At this stage the contractor still had three weeks in which to complete the work of laying track along the remaining one third of the route. The road surface was packed around the rails at this juncture and seemed to present few problems for the road traffic wishing to cross the tramway. The report indicated that the road material on the inside edges of the rails would have to be cleared before the trams could use the route.

By mid November the construction contract had been completed from the railway terminus to Argyle Street, at Circular Quay.<sup>25</sup> The rails at the railway station met the railway at right angles and

two tracks branched off in the station yard. The one intended for goods waggons connected with the railway track by a turntable while the other, for passenger traffic, was carried up to the station. These rails were at the same level as the surface of the railway platform.

Some sections of the community suggested that the tramway should have been taken through the property to the east of the Benevolent Society Asylum to meet the railway tracks end on. This was the route eventually taken when the Redfern railway terminus was extended to the new Sydney terminal at Eddy Avenue in 1906. This tramway proposal could not be contemplated as the Act only authorised tramway construction along Pitt Street, while the design of the tramcars would not enable passengers to readily join the vehicles in the normal railway platforms.

**Trackwork Problems.** In the short space of two months after the start of track construction problems were experienced with the permanent way. At several places along the route the rails had curled upwards lifting the longitudinal sleepers. At first the fault was thought due to the timber being machine cut rather than hewn and dressed by hand, but this problem was later evident on both cuts of sleepers. This fault was found to be caused by the expansion of the step rail in the hot spring weather. No allowance had been made for expansion where these iron plates abutted together causing the centres of the rail strips in some locations to bulge upwards. This problem was increased by the use of unseasoned ironbark timber for the sleepers. The speed in which the contract had to be completed left no alternative in this matter. By late November the faulty portions of the track were being repaired.

**Contract for Providing Horses.** By late October 1861 negotiations were being finalised for the horsing of the tramway and the "collection of tolls".<sup>26</sup> During November the Railway Department announced that some train arrival and departure times would be adjusted so that one tramcar would have adequate time to work along the tramway and return in time for the next train arrival or departure.

On Tuesday 26 November 1861 the tender of Mr. John Woods for the provision of tramway drivers and the supply of horses was accepted<sup>27</sup> while in Monday 16 December the announcement was made that the 10am train from Sydney would leave at 10-15am and the 4-45pm would depart at 5pm.<sup>28</sup> The train departing from Campbelltown of 9-45am was altered to 10am and the 6-15pm was changed to 4-45pm. No alterations were made to the Sunday services.

**Trial Operation.** On the morning of Wednesday 4 December the first trial run along the tramway was conducted with two railway trucks drawn by

horses.<sup>29</sup> Although some further work would be needed to clear the soil away from the rails before the tramcars could operate, the tramway was found to be in good order.

Trials conducted with the passenger cars during the following week were not as favourable. The tramcar derailed several times on the sharp curve leading from the station yard into Pitt Street, but this problem was rectified by raising the outer rail further on this curve. The straight track was still uneven due to the problem of unseasoned sleepers, but this was expected to be gradually corrected in the course of normal maintenance.<sup>30</sup>

The main cause of the tramcar derailments, as compared with the successful trials with the railway waggons, was due to the small  $\frac{3}{8}$  inch flange fitted to the tram wheels. G. F. Train had designed these flanges as small as possible to enable tramcars to leave the tracks when passing obstructions. The Pitt Street Tramway Act, unlike the English provisions, compelled all other vehicles to make way for the tramcars and railway trucks so the trams would only have to be lifted from the tracks to pass "these cars and railway trucks".

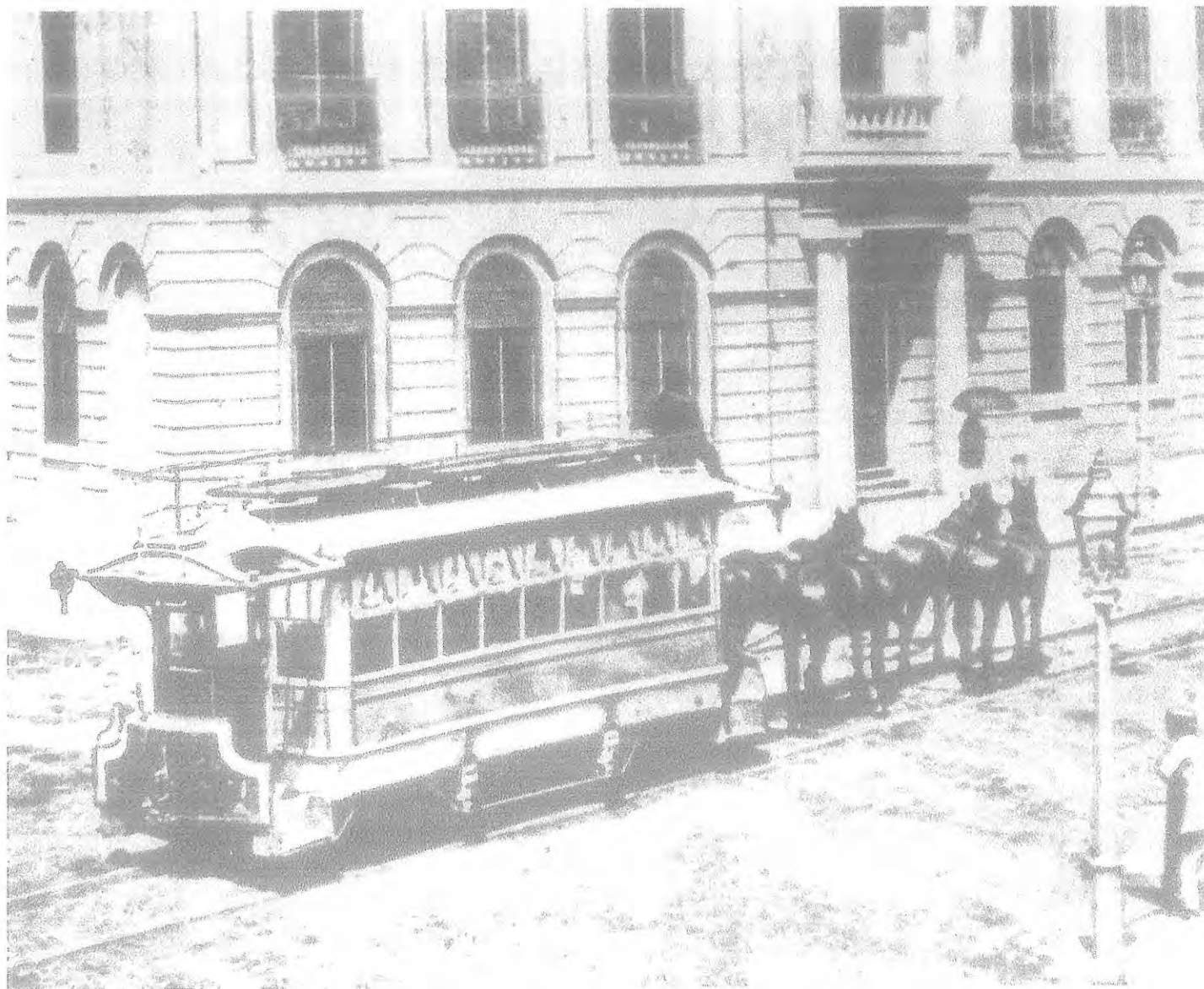
By mid December the tramcar wheels had been reprofiled to increase the flange depth. The problems which emerged during the trials caused some of the original opponents of the project to judge "the whole affair a failure".

**Opened for Traffic.** The tramway opened for traffic on Monday morning 23 December 1861 when one of the tramcars, drawn by four horses, left the railway terminus soon after 6 am. The return trip departed from the Quay at 6-25am taking up passengers for the 6-45am train from Redfern. This first  $1\frac{3}{4}$  mile journey of a street tram in Australia occupied less than 10 minutes!<sup>31</sup>

With the arrival of two trains at Redfern the tramcar departed for the Quay crowded with passengers who were set down along Pitt St. where ever they so desired.

The opening day report stated that no trouble had been experienced on the sharp curve at the entrance to the railway terminus nor on any of the uneven sections of the track. "The motion of the car is extremely easy and comfortable and passengers accustomed to the rattling and jolting of the 'buses' will appreciate the means now afforded of entirely escaping from these annoyances".

This same report revealed further details of the tramcars. The cars could seat thirty passengers inside and a further thirty on the roof seats, but one trip on that opening day carried at least 75 passengers. The "outside of the car has a rather gayish appearance, the body being a lively yellow; in the centre a lion and an eagle, taking the place of the unicorn, being represented with the motto "Unity is



*The other of the two Pitt Street horse car photos, this time with four black horses. It has not been possible to determine if the same car is in both photos.*

the strength of the Nations". The names of the cars are respectively "Old England" and "New Australia".

"There is a driving box at either end of the car and arriving at the Circular Quay the driver shifts his place and the pole and the horses are transferred" to the opposite end for the return trip.

The single far cost 3d on the tram, being 1d cheaper than the previous omnibus fare. No charge was made for children travelling with an adult.

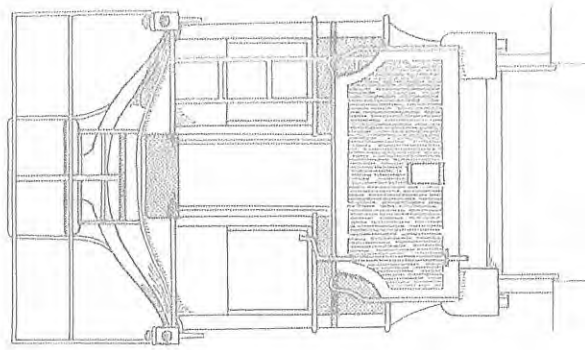
The initial Pitt St. Tramway Timetable listed trams as leaving the Quay at 6-25am, 9-55am, 1-40pm, 4-40pm and 6-10pm on weekdays while on Sundays the cars departed at 8-10am and 4-40pm.<sup>32</sup>

**George Francis Train.** George Francis Train, an eccentric entrepreneur, was born in Boston U.S.A.

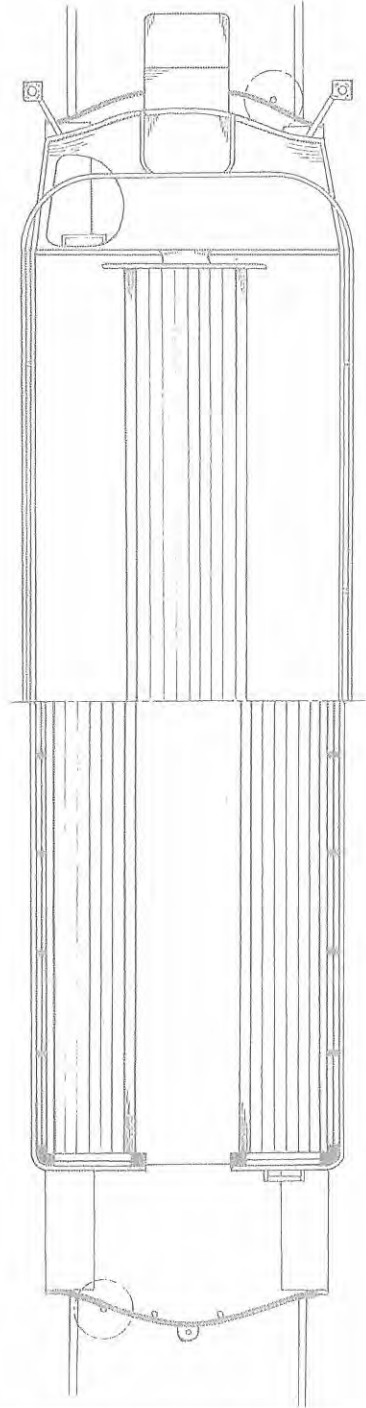
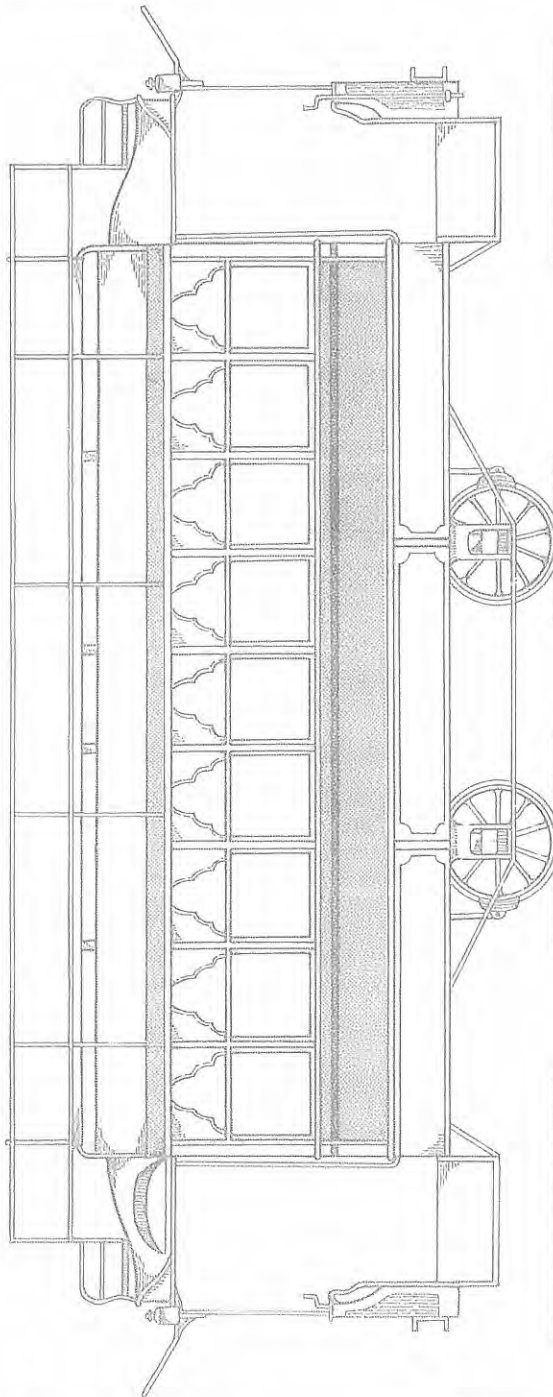
on 24 March 1928.<sup>33</sup> Four years later, when his family resided in New Orleans, his mother and three sisters died from yellow fever. His father sent young George to his maternal grandmother in Boston. His uncle engaged him as a clerk in the family shipping business during 1845 and this proved to be the first step in a successful commerce career.

During 1850 George worked as manager of the firm's branch office in Liverpool England and in 1853 he arrived in Melbourne to establish a subsidiary mercantile house. He constructed a warehouse at Port Melbourne and an office in Flinders Street. It is believed that George Francis Train initiated the movement which resulted in the construction of the private steam railway between Port Melbourne and Melbourne during 1854. He





PITT ST.  
HORSE CAR  
1861





also imported the first Concord coaches from U.S.A. and encouraged Freeman Cobb to use these to start the famous Cobb and Coy. coach line.

Francis Boardman Clapp, also a native of Massachusetts, arrived in Melbourne in 1853 and was appointed the agent for the Concord coaches. In 1857 Clapp advanced into the coaching business, co-ordinating some Victorian services with the Cobb and Coy. workings and in 1860 tried to obtain approval for the construction of a horse tramway along Bourke St. to Collingwood without success.

Clapp was the director of a Company which developed horse bus lines in Melbourne from 1869 and this eventually expanded into the Melbourne Tramway and Omnibus Company which opened the first route of the successful Melbourne cable tramway network on 11 November 1885.

During his 2½ years in Australia George Francis Train visited both Sydney and Tasmania. He left Melbourne in November 1855.

**Interest in Horse Tramways.** In 1858 Train noticed the success of horse worked street railways in Philadelphia. He returned to England and endeavoured to convince the Liverpool Corporation that horse tramways would be an asset in that city, but without success. G.F. Train was successful on the other side of the Mersey at Birkenhead.<sup>34</sup> His tramway from Woodside Ferry to Birkenhead Park opened for traffic on 30 August 1860 with two single deck and two double deck four wheel saloon horse cars identical to the Sydney vehicles.

These tramcars were based on those designed by Andrew Palles for use in Philadelphia.<sup>35</sup> The vehicles were imported in sections and assembled in Birkenhead by coach builder Robert Main. Trains step rail caused problems and this was replaced soon after by grooved rails. At this time the opportunity was also taken to regauge the tramway from 5'2" to 4'8½" and to reroute it through adjacent, but more convenient streets.

During 1860 Train canvassed London authorities for permission to build horse tramways in that city. Only after lodging cash guarantees of 10 shillings per yard of track, to be used to remove the track if the undertaking was unsuccessful, was he able to construct three isolated horse tramways.

The first, between Marble Arch and Porchester Terrace in Bayswater opened on 23 March 1861, that from Victoria Station to Parliament Square on 14 April 1861 and the third, from Westminster Bridge to Kennington Gate on 15 August 1861. As a result of opposition caused by omnibus and cab interests as well as protests raised following accidents on the tramways, the Bayswater line closed in September 1861, the Victoria St. route on 6 March 1862 and the Kennington Gate line ceased on 20 June 1862 when the track was torn up under sheriff's orders while the trams were still running.

During late 1861 the fact emerged that the Turnpike Commissioners had no power to approve tramway construction.

Although lithographs show the London tramcars at Marble Arch to be named "Napoleon" and "Victoria" these were only the results of a promotional letterhead artist. The Marble Arch cars carried the names "Princess Royal" and "Her Majesty" while the Victoria St. tramcar was named "The People".

The tramcars on these three London routes also resembled the Sydney cars. Although contemporary sketches show double decker cars in use, it is now believed that only single deck vehicles were employed in London. The Marble Arch route was worked by three cars, one is known to have operated at Victoria St. while at least two ran on the Kennington Service.

A similar undertaking opened in Darlington on 1 January 1862 closed in 1866 due to problems with the step rail, but the route opened between Hanley and Burslem in the Potteries District on 13 January 1862 continued in operation.

The success of the Potteries tramway was mainly due to the step rails being replaced with grooved rail in 1864.

**Train's Later Activities.** On his return to the U.S.A. Train was involved in the railroad boom. He was one of the organisers of the "Credit Mobilier" a construction facilitator or dummy company of the Union Pacific Railroad Coy. then building the eastern portion of the first U.S.A. transcontinental railway between Omaha Nebraska and Sacramento California. This connected with the western part built by the Central Pacific at Promontory Point Utah in April 1869.

The later Congressional Inquiry into the affairs of the Credit Mobilier was to cause a scandal with far reaching repercussions for future railway financing methods.

In 1872 Train nominated as an independent candidate for the Presidential elections in U.S.A. He failed to make any impression on the poll. The election was a two sided contest, Republican candidate Ulysses S. Grant was elected to a second term as President with Henry Wilson as his Vice President against the Democrat candidates Horace Greeley and B. Gratz Brown.<sup>36</sup>

Just prior to this presidential campaign, Train travelled around the world in eighty days giving Jules Verne the idea on which he based his famous novel. In 1890 Train repeated the journey in 67½ days and a third trip two years later further reduced the time to 60 days.

From the time of the Presidential campaign Train was considered an eccentric. Following the death of his wife in 1877 Train lived as a recluse and it was only towards the close of his life that he

returned to more "rational" ways. He died on 18 January 1904 after writing his autobiography "My Life in Many States and Foreign Lands". (Heinemann 1902).

**Advantages of Tramways.** One economic theory advanced in 1861 in favour of horse tramways argued that as horses could pull a greater pay load on rails the fares can be 33% cheaper than those charged on omnibuses. In London it was found that the wealthier members of the community used cabs while the poorer classes, who could not afford omnibus fares, walked. The more spacious design and comfort provided by tramcar construction was expected to make tram travel attractive to the middle classes, while the reduced fares would be within the reach of the poor.<sup>37</sup>

At Birkenhead it was found that the tramway caused property values along the route to rise by 20% and as the tramway company was responsible for the repair and maintenance of the adjacent road surfaces and as the popularity of tram travel removed much heavy traffic from the roadway, the general highway rates were expected to fall.

**Designated Pitt Street Stopping Places.** On 27 December 1861, just four days after the introduction of the Pitt St. tramway service, designated stopping places were introduced. These were located at Bridge, Hunter, King, Park, Bathurst and Liverpool Streets. This change was made to improve the trams ability to connect with each train at Redfern. The half mile between the station and the first stopping place at Liverpool Street gave cause for complaint. A correspondent complained in the "Sydney Morning Herald" for 6 March 1862 that this long distance caused people to jump from the moving car and just recently a passenger was injured when alighting in this manner.

A later letter under the name of "Daily Passenger" complained that the late running of the tramcars caused some passengers to use cabs as they feared missing the connection. In addition, trains were sometimes delayed up to 15 minutes awaiting the arrival of the trams at Redfern.<sup>38</sup>

**Dangerous Driving.** Driver Patrick of the horse car "Old England" was called before the Police Court during late February 1862 for driving too fast and recklessly.<sup>39</sup>

Just before this matter was raised, John Bell was driving his dray across the tramway at Gipps St. on Saturday evening 15 February 1862. It seems that he was in a drunken state when he collided with the tramcar horses forcing them off the line. The tram was under the control of driver Patrick Delany. Bell was found guilty, in the Police Court on the following Monday, of wilfully destroying two traces and a belly band of the tram horses valued at 50 shillings. Bell was ordered to pay the cost of damages or be imprisoned for seven days.<sup>40</sup>

**J. Wood's Control Extended.** From the end of September 1862 Mr. John Woods took over the lease of the Pitt Street tramway which allowed him to operate the tramcars along the line as often as he wished.<sup>41</sup> The only stipulation directed him to meet every arriving and departing train at Redfern. This contract could be cancelled at three months' notice by either Mr Woods or the Railway Commissioner.

The rent charged amounted to "2½% on the entire outlay". John Woods also contracted for the conveyance of goods traffic along the tramway at 2s6d per ton.

In the meantime the service on the tramway had been increased with trams leaving the Quay on weekdays at 6-25, 9, 9-55 and 11 am, 1-35, 3-30, 4-35, 6 and 6-10pm. The last two departures would have required both tramcars in service.<sup>42</sup>

**Goods Traffic on the Tramway.** During 1862 the southern railway was being extended from Campbelltown to Picton. The crossing of the Nepean River at Menangle required the construction of a large three span plate girder bridge. The iron for these spans was shipped from England in January 1862 but the ship carrying spans one and three was wrecked. The middle span arrived during May 1862 but the girders were carried by horse hauled road waggon from the wharf to the railway terminus. The "Sydney Morning Herald" criticised the Railway Department for not using the facilities of the Pitt St. tramway for the carriage of this ironwork, but remarked that no preparation had yet been made for the handling of goods traffic on the tramway.<sup>43</sup>

On Monday 13 October 1862 the tramway "was brought into use for the first time for the conveyance of goods". The replacement iron plates for the third and first spans of the Menangle bridge had arrived on the ship "Ocean Empress" and these were conveyed along the tramway in railway waggons hauled by four horses and then taken to Menangle without being transhipped at Redfern.<sup>44</sup>

**The Sydney Tramcars.** The origins of the two Sydney tramcars is not clear. George Starbuck, the manager of Train's London tramways, opened his tramcar building business in Birkenhead during 1862 and continued constructing tramcars to the original Birkenhead, London and Sydney design for the next ten years.<sup>45</sup>

It is quite feasible that Train ordered adequate vehicles for several other documented proposals in the 1860-62 period and two of these cars were forwarded to Sydney. His initial English trams were imported from U.S.A. in sections by Elijah Prentiss, the principal of an American importing business in Birkenhead, who was also in partnership with Train. These vehicles were assembled by Robert Main in Birkenhead.

Evidence suggests that a further two tramcars



and a quantity of rails were sent to Melbourne by G.F. Train for the F.B. Clapp Bourke Street tramway of 1860-61.<sup>46</sup> This aspect needs to be further researched and the ultimate use to which these two tramcars were placed is a query which also needs to be answered.

The two tramcars delivered in Sydney in 1861 suffered storm damage and arrived in a weakened state. Press reports of October 1862 indicated that one of the tramcars was then undergoing repairs<sup>47</sup> and consequently the (other) car has been occasionally overcrowded; after next week both cars will again be brought into use<sup>47</sup>.

A Railway Department rolling stock report with entries up to May 1864 shows an additional tramcar, 10 horse boxes and 2 carriage trucks built in the Railway Workshops at Redfern terminus. The last entry in the non-goods category on this return shows this tramcar as costing £378-0s-11d and carrying No. 3. This would mean that the new tramcar would have been constructed between 1862 and July 1864.<sup>48</sup> By that stage the two original cars carried numbers 1 and 2.

A further Railway Department report for the year ended December 1865 reveals that tramcar (2nd) No. 2 entered service during May 1865 having been constructed at the Sydney Railway Workshops. This car weighed 3 tons 2 cwt 3 qts and was carried on four 2ft-6in diameter wheels.<sup>49</sup>

The entire Sydney tramway rolling stock roster therefore consisted of four tramcars; 1 and 2 supplied by G.F. Train in 1861 and 3 and (2nd) 2

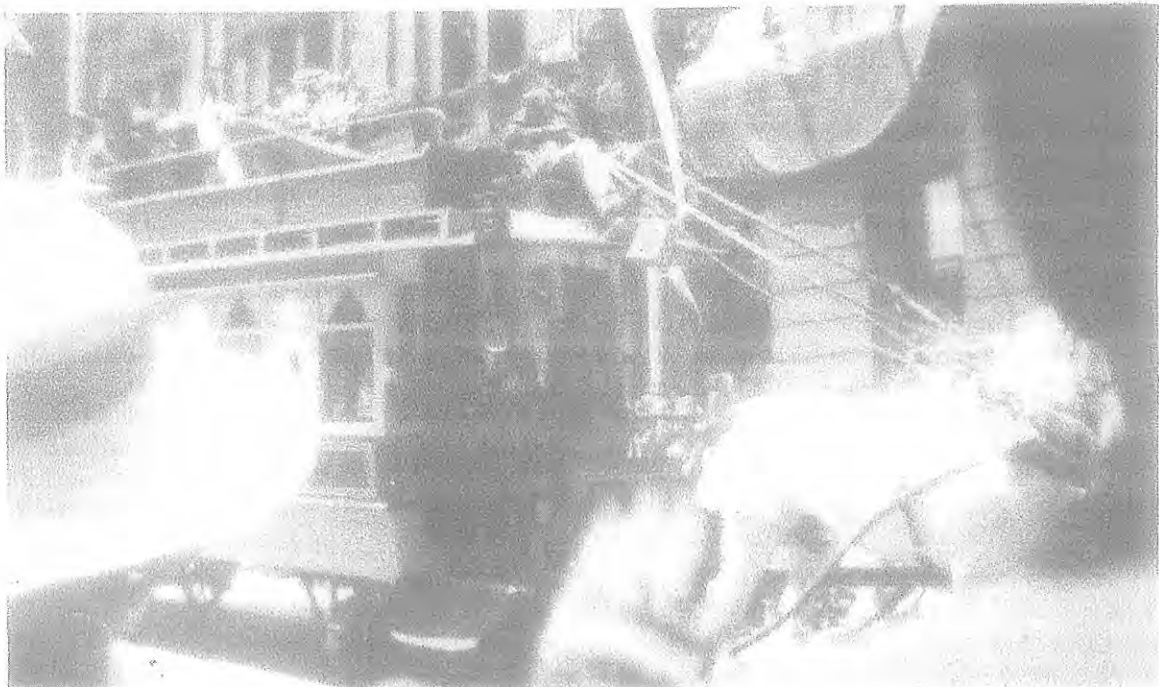
built later in the Redfern Railway Workshops. It is doubtful if the original tramcars lasted until the 1866 closure. Original number 2 would have certainly been withdrawn from traffic prior to May 1865.

The English tramcars built to Train's specifications were 24ft. in length,<sup>50</sup> 7ft wide and drawn by two horses. Repeated reference to the capacity of the Sydney cars state that 30 passengers could be seated in the saloon. This would require a saloon length of at least 22ft.<sup>51</sup> Photographs suggest that the platforms at each end would be at least 3ft. each making the length of the Sydney tramcars around 28ft. The Sydney tramway also used four horses to haul each car.

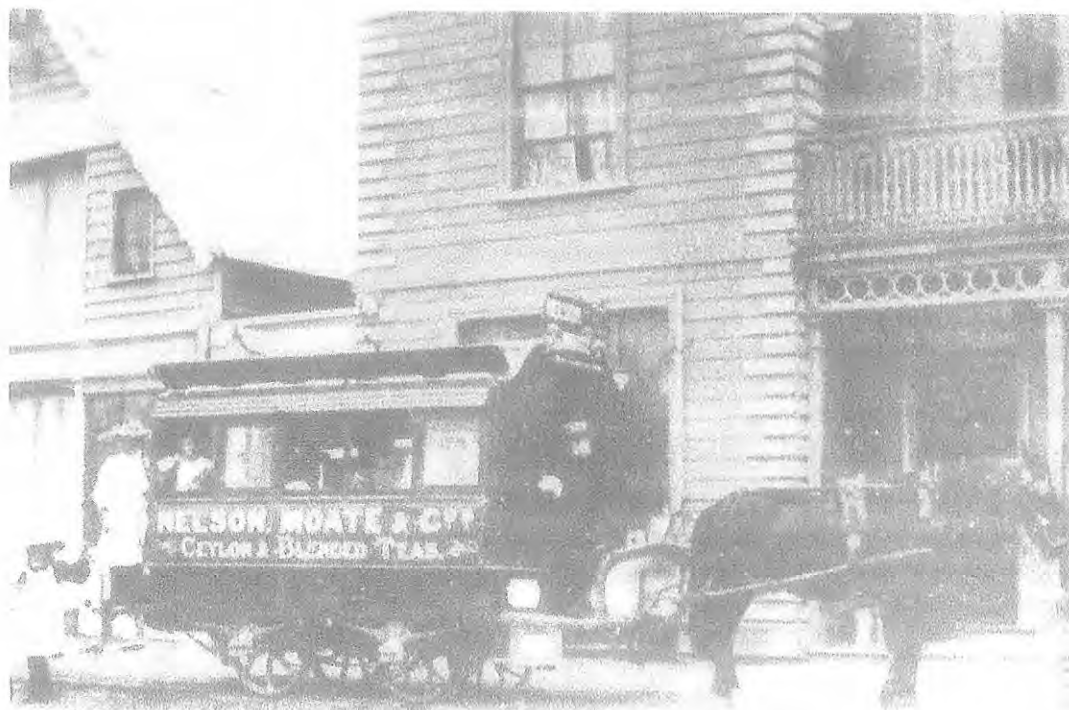
**Other Tramcars.** Between 7 May 1862 and 1901 a horse tramway service operated along the one mile harbour end of the 13 mile 3 ft gauge Dun Mountain Tramway which transported chrome ore to the New Zealand port of Nelson. The passenger portion of the operation linked the Port with Trafalgar St. Nelson.<sup>52</sup>

The first of two cars used on this service was a four wheel end loading saloon tram with five windows on each side and longitudinal outward facing benches on the roof. This was constructed by Mr. Kearey of Pitt St. Sydney in February 1862. The following contemporary report provides details of this tramcar when it was placed on inspection at Mr. Kearey's coach works in Pitt Street on Saturday 22 February 1862.

"The carriage somewhat resembles the Pitt St



*Former Sydney electric tramcar C94 rebuilt to resemble an 1861 Pitt Street horse car, in the January 1938 sesqui-centenary parade. - late J. McCarthy*



*The Sydney built Dun Mountain tramcar at Nelson New Zealand.*  
- G.C. Stewart collection

Tramway cars, having a landing at either end; it is, however, smaller in size, the width of the gauge being only three feet and the dimensions of the vehicle ten feet by five. Provision has been made for thorough ventilation by a succession of openings in the roof, occupied by perforated plates in imitation of cane; and the apertures at the side are furnished with shutters, as well as with glass windows. There are double seats on the roof, which are easily ascended from the landings, and around which is an iron railing for the protection of passengers. The carriage is constructed to hold forty passengers and to be drawn by one or two horses; as may be required, the shaft being removeable from one end to the other; the weight of the carriage is about a ton. The timber used in its manufacture is cedar and blue gum, the body of the vehicle being beautifully grained in imitation of forest oak, which gives the exterior a very light and elegant appearance; the panels are all cedar. The carriage has cost £300; it has been examined by Mr. P.N. Russell, on behalf of the company who expressed himself satisfied with it. The entire work was performed at Mr. Kearey's manufactory; and it is a specimen of colonial workmanship, it does credit to the establishment. This is the first railway carriage of any kind manufactured in these colonies and there can be little doubt...that it will lead to the manufacture

in Sydney of the carriages required for our own tramways and railways".<sup>53</sup>

**Composer Killed.** On Friday 15 January 1864 a noted member of the Sydney community, composer Isaac Nathan, was run down and killed as he was alighting from tram No. 2 at the Goulburn St. corner. The coroner judged this to be an accidental death, but commented that communication between the front and rear brakemen was not satisfactory enough to stop the large tramcars in an emergency. From this time onwards the tramway was ridiculed by the press as well as in parliament.<sup>54</sup>

**Future of the Tramway.** It appears that a petition for the removal of the tramway was drawn up as early as June 1862.<sup>55</sup> On 28 November 1865 Mr. Buchanan moved in parliament that the Pitt St. tramway was a dangerous nuisance and should be removed without delay. An amendment by Henry Parkes referred the subject to a Select Committee. On 27 March this Committee recommended the closure of the undertaking, when the lease terminated at the end of the year, and the removal of the rails. On 4 April 1866 this report was adopted 27 to 12 in the Lower House.

**The Pitt St. Tramway Repeal Bill.** On 6 November 1866 the Repeal Bill was debated in Parliament. The arguments advanced for and against tramway retention are summarised:-<sup>56</sup>

1. A large majority of the people are against the tramway.



2. A large waste of public money will result in the removal of the line.
  3. The line is a great convenience to the public and only an inconvenience to a few.
  4. One of the few public works in the colony which is remunerative.
  5. Looking at the magnificent buildings being erected along Pitt St. it would appear that the tramway has done no harm to trading there.
  6. The work had cost £6,000 to set down and what little defect does exist with the rails could be rectified for £500.
  7. If the Pitt St. merchants were polled the majority would retain the tramway.
  8. No goods shed has been erected at the Quay as promised and the trams have been solely for the convenience of a particular class.
  9. Rails have not been laid down correctly and numerous accidents have occurred.
  - 10 "It never had a chance"...The representatives of the city, after an enquiry by the Corporation, opposed the laying of the tramway. Several lives have been lost through the tramway and numerous accidents have occurred.
  - 11 The rails were laid so that no vehicle could cross with safety unless at right angles.
  - 12 The only people who found the tramway a convenience were those in the suburbs and it should not be kept in existence to oblige them seeing that it is a dangerous nuisance to the rest of the colony.
  - 13 There will be an expense involved in removing the rails, but they can be used elsewhere. They should have remained in a heap at Redfern terminus and never laid down.
  - 14 Anyone wishing to drive up Pitt St. generally diverts to George Street with the result that that thoroughfare is overcrowded, because of the space taken by the tramcars. George Street will be relieved when the trams are removed.
  - 15 A parliamentarian stated that if he sends someone from the Quay towards the railway station on an errand, he instructs the messenger to travel by way of Kent Street thus avoiding Pitt St.
- The repeal Bill passed the second reading the Lower House 23 to 3, The Third reading was passed on 7 November and the Bill moved to the Upper House. On Thursday 15 November 1866, during the second reading in the Legislative Council, identical points were raised to those expressed in the Lower House. Two further aspects were mentioned:-

1. The tramcars should be replaced by a railway extension to Hyde Park or by a new route from Darling Harbour to the Quay.
2. Buses can handle the passenger loads at present.<sup>57</sup>

The Bill finally passed the Third reading in the Upper House on 22 November.

**Last Day of Operation.** The trams operated for the last time on Monday 31 December 1866 and on the following morning Mr. John Woods commissioned four large omnibuses on the route. Two of these had been built especially for the conversion. These buses followed the tramway timetable and the fares remained at 3d. for the through adult journey.<sup>58</sup>

On Tuesday 1 January a gang of 30 or 40 men started the removal of the rails, most of which had been removed by the end of that week.<sup>59</sup>

**Tramway Proposals.** When the Pitt St Tramway was first proposed, Railway Commissioner Martindale intended using discarded "Barlow" or bridge rails from the original Sydney to Parramatta railway, but Train's patent step rails were adopted and this move caused the main objections to the tramway as the trial period of operation progressed.<sup>60</sup>

On Tuesday 17 September 1861 a meeting was held of interested residents to discuss the advisability of forming a company to build a horse tramway or railway to Botany using G.F. Train's patents. Mr. Holt promised to subscribe £1,000 to the project while Mr. Lord offered to match this amount if the company was formed.<sup>61</sup>

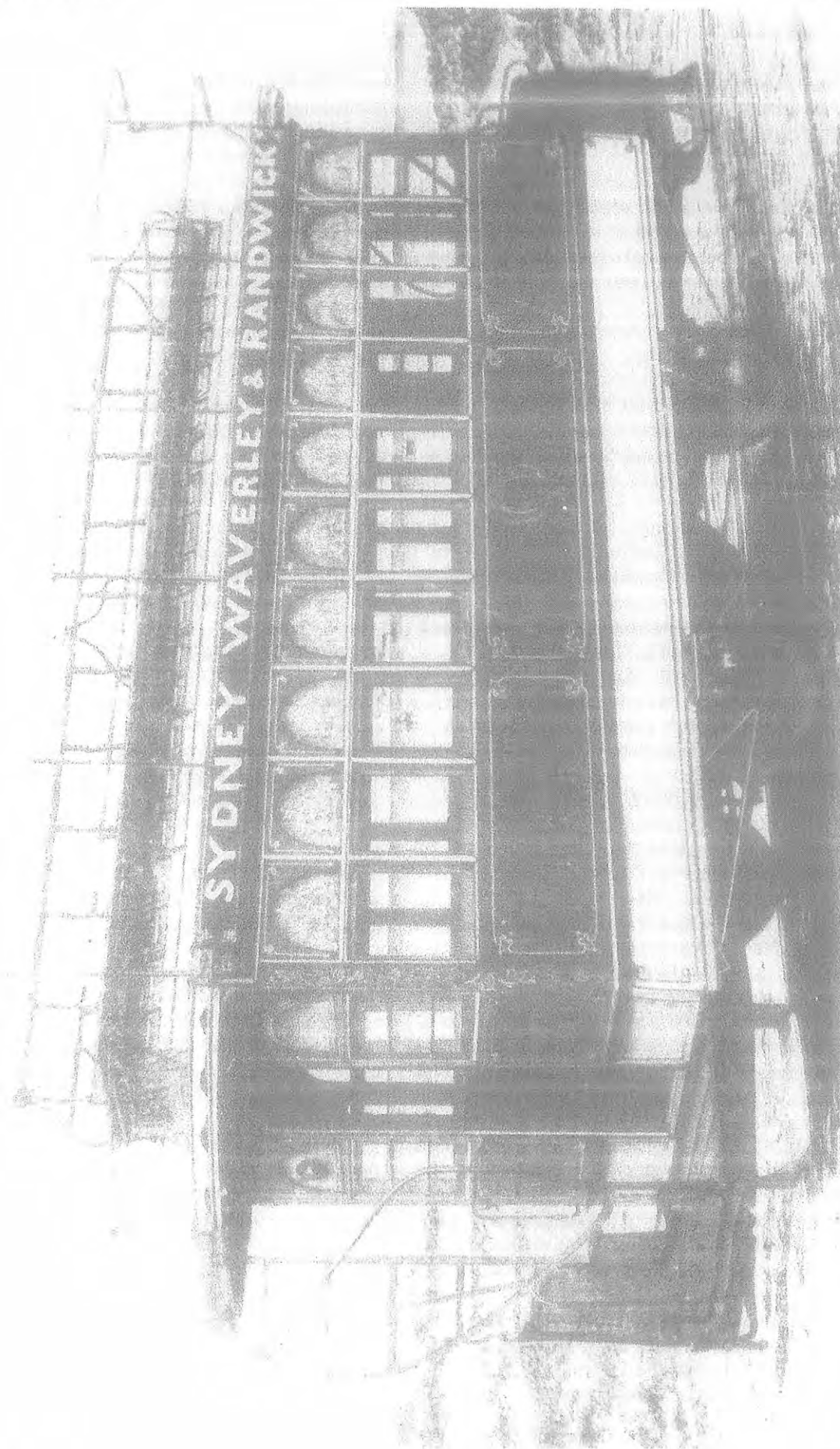
By 1862 plans for this scheme had progressed to a stage where likely routes were being investigated. At this stage the horse tramway proposal from Redfern to Botany had been amended to one for the construction of a light railway to branch from the Sydney to Parramatta railway at Newtown. This would be worked by either horses or a light railway engine.

The scheme failed to reach fruition and rail worked transport did not reach the Botany area until 1882 in the form of a steam tramway route. **Further Use for the Pitt St. Tramcars.** Both tramcars were transferred to the railway rolling stock lists after the closure of the Pitt St. line.

Tramcar (2nd) No. 2 appeared as a single deck railway saloon car in 1867 and was shown as 1st class car No. 9 by July 1869. It transferred to duplicate stock in 1890 and was written off between 1895-7.

Tramcar No. 3 became 2nd class railway carriage No. 48 in the July 1869 lists. It was classed as a single deck car with brake gear. In September 1875 this car was reclassified as composite brake car No. 6 and was written off during 1895-7.

At this stage photos have not been found of these two vehicles in railway service, but it is believed that they were used on the Campbelltown to Camden and the Blacktown to Richmond railways. In railway service the cars were entered as weighing 5.8 tons.



*The Hudson Brothers double deck horse car which was used to open the Sydney Station to Hunter Street tramway, along Elizabeth Street in September 1879 pending erection of the Baldwin steam tram motors ordered for this undertaking. - N.S.W. Government Printer*

**Reintroduction of Horse Cars.** On 13 March 1879<sup>62</sup> a Bill for the construction of a steam tramway from the railway terminus to Hunter Street along Elizabeth Street and not Pitt Street, was introduced by Mr Lackey in Parliament. This received assent on 7 May 1879 and the progress of a parallel Bill permitting the construction of a railway extension from Redfern to the Quay was stopped by prorogation.<sup>63</sup>

This tramway was planned to be a temporary expedient to take visitors to The International Exhibition being held in the Garden Palace at the Botanical Gardens. The service proved so popular that the tram service was retained and extended to eventually become the largest tramway undertaking in the southern hemisphere.

The steam motors ordered for this tramway were not ready for the opening of the new tramway on 16 September 1879 so horse operation commenced using two cars constructed by Hudson Brothers as an emergency measure in case the steam rolling stock deliveries were delayed. The Hudson cars were modelled on the 1861 tramcar design, by then outdated. The 1879 cars, however, carried 10 windows on each side of the saloon while the upper deck seats were reached by a primitive spiral (helical) staircases in place of the iron ladders on the 1861 vehicles.

One steam tram shared the service with a horse car on 28 September 1879 and on the following day the second steam tram motor was available enabling complete steam services to be worked from that day onwards.

The assistance of Rev. C.B. Thomas, and Messrs. D. Estell, K. Magor, F. Moag, V. Solomons, R. Willson and C. Woodside is acknowledged in the preparation of this article.

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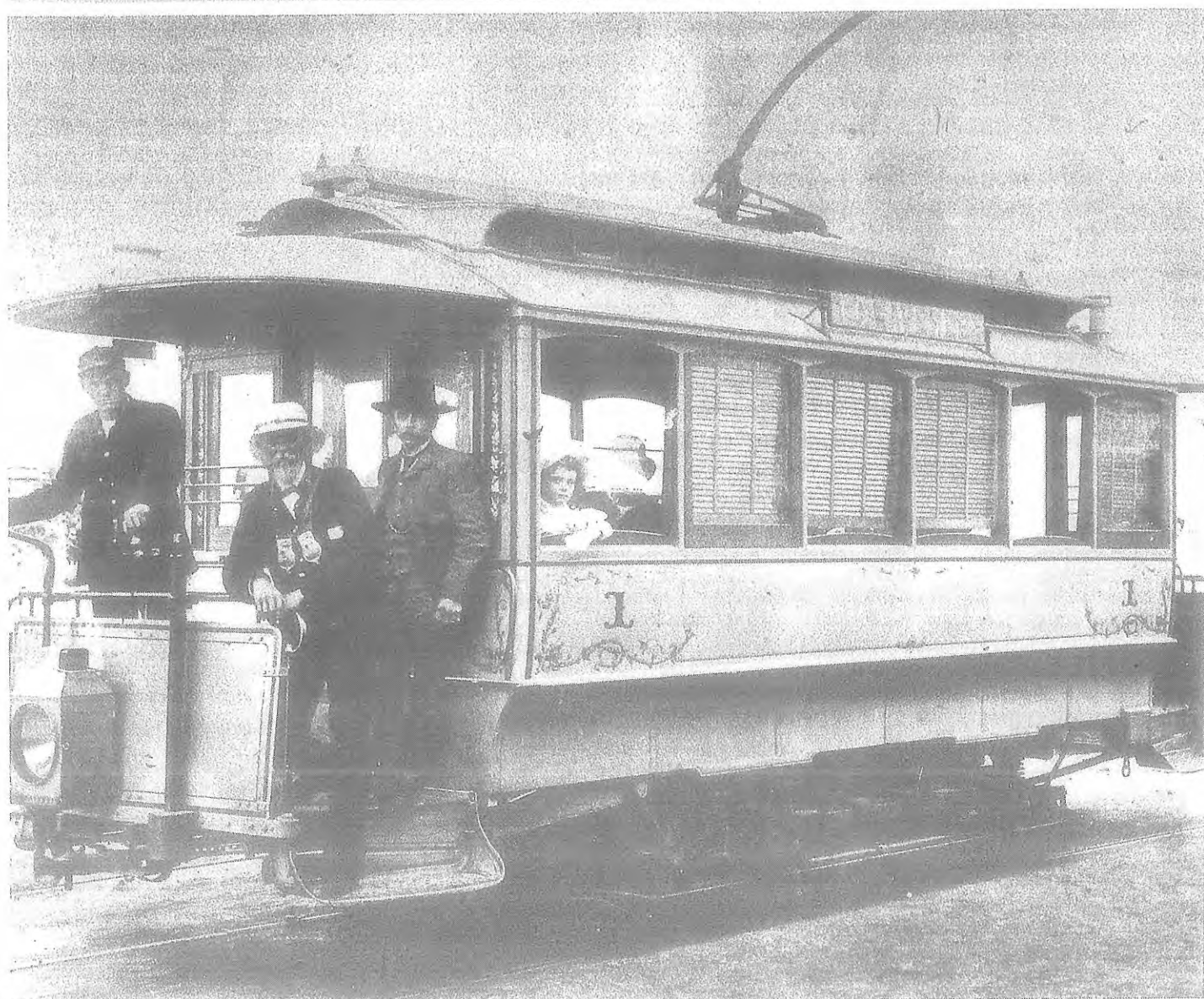




# TROLLEY WIRE

No. 243

NOVEMBER 1990



**SYDNEY'S EXPERIMENTAL ELECTRIC TRAMS**

# THE EXPERIMENTAL ELECTRIC CARS

## WAVERLEY TO RANDWICK TRAMWAY — 1890

By K. A. McCarthy

November 1990 marks the centenary of the introduction of electric tram running trials on the Waverley to Randwick cross-country route in the eastern suburbs of Sydney.

An account of these trials was presented in Volume 1 of *A Century of NSW Tramcars*. This expanded material has been prepared for a possible reprint of that work.

\* \* \* \* \*

Tramway practices introduced in the United States of America during the nineteenth century greatly influenced the transportation scene in New South Wales. That dynamic, but eccentric, American entrepreneur George Francis Train (1829-1904) influenced the design of the 1861 to 1866 Pitt Street horse tramway in Sydney. Captain Martindale, the NSW Government Railways Commissioner, selected Train's patent step rails and ordered two of Train's tramcars when he visited the first British street tramway in Birkenhead soon after its opening on 30 August 1860.

About twenty years later, when Sydney witnessed a tramway revival in its streets during 1879, U.S. technology was again employed by the adoption of Baldwin steam tram motors and Gilbert Bush & Company double-deck trailers.

By 1890, 8100 tramway track miles (13000km) served by 33,000 tramcars operated in the USA. Of these totals 1300 miles (2100km) were worked by 2900 electric cars. It is not surprising that on embarking into the realms of electric traction during 1890 the New South Wales Government Tramways (NSWGT) decided to use American rolling stock and equipment for their new venture.

### The Centennial International Exhibition in Melbourne

To mark the centenary of the establishment of the first British settlement in Australia at Sydney Cove in 1788, Melbourne staged an extravagant "Centennial International Exhibition" in the large Exhibition Building and the surrounding grounds. This structure had been erected for a similar trade display held in 1880. The exhibition extended from 1 August 1888 until 11 March 1889 and one exhibit available to the public for part of this period was a working electric tramway provided by the Thomson-Houston Electric Company of Boston, USA.

This exhibit was so successful that it won a first prize, an Award of Merit and a special mention in the relevant judging sections.

The official guide book to the exhibition described the standard gauge electric tramway worked by a single four-wheel open crossbench car in the following terms:

#### Page 61

No. 284 — Thomson-Houston Electric Company. The exhibit of the Thomson-Houston Electric Coy includes an electric tramway in complete working order, arc and incandescent lighting worked from the same dynamo . . .

#### Page 143

The Thompson (sic) Houston electric tramcar which is constantly running in the Exhibition Grounds is the first thing of the kind that the untravelled Victorians have seen, and the smoothness and noiselessness with which it runs are warmly commended. It is in contemplation to introduce the electric tram in Ballarat and other cities but the cable system works so admirably in Melbourne that there seems little chance of it being displaced.

This equipment was sold to a land boom company registered as "Box Hill and Doncaster Tramway Coy Ltd" where it opened Australia's first commercial overhead trolley electric tramway on a 2-1/4 mile (3.6km) route in the eastern outskirts of Melbourne on 15 October 1889.

### Background to the Waverley-Randwick Experiments

With the passing of the Railways (Reorganisation) Act of 1888 by Sir Henry Parkes' administration, the NSWGR Commissioner Charles Goodchap was replaced by a triumvirate of a Chief Commissioner, E.M.G. Eddy and two Assistant Commissioners, W.M. Fehon and C.N.J. Oliver.

The Act aimed at improving the efficiency of the Government Railway and Tramway services in New South Wales by removing these organisations from direct political control. These gentlemen took up their new appointments on 22 October 1888. An announced intention of the



new board of commissioners was to consider the relative merits of steam, cable (of which examples already operated in Sydney) and the infant electric forms of tramway propulsion.

Overseas advice received during 1889 on the development of electric traction proved encouraging, which, with technical details furnished by the Thomson-Houston representatives in Australia, resulted in approval being given for the trial electrification of portion of the Waverley to Coogee 'cross-country' tramway. These operations would be conducted by the Thomson-Houston Company in conjunction with the Tramway Department.

The Parliamentary Public Works Committee of 1890-91, which conducted an enquiry into the type of traction to be used on the proposed steeply graded tramway between King Street, Sydney and Ocean Street, Woollahra, and the George Street to Pyrmont route, were eager that the Waverley experiment should be undertaken. They also voiced the desire that similar trials of the Sprague Company and a further experiment of the Julien accumulator tramcar would also be of importance in aiding the selection of the mode of traction most suitable for these new tramways.

Due to the merger of the Sprague Electric Railway and Motor Company with the Edison General Electric Company in 1889, and the fact that the Edison and Thomson-Houston companies commenced negotiations for a merger in 1889 (but which did not eventuate until 1892), the Sprague test in Sydney did not take place.

E. Julien, an electrical engineer in Brussels, experimented with battery-propelled electric tramway systems after 1881 with some success. From 1886 to 1889 he endeavoured, with the encouragement of US patent lawyer William Bracken, to establish his system in the USA. The only original item in Julien's system was his heavy duty batteries, which were fitted to standard horse cars together with motors and chain transmissions provided by other firms.

A double deck accumulator car provided by the Australian Electric Tramway Company and fitted out with the Julien battery system, made a trial trip on the Sydney to Botany line on 1 June 1888. It possibly operated further trials on the Kogarah steam tramway later in that month. As with the US operations the batteries were unsuitable for the task and proved more expensive than established steam and horse propelled systems.

A Julien trial was not repeated under the 1890 Public Works Committee directive but a later experiment conducted in Sydney with car 197 (modelled on the 70 seat C2 type steam tram trailer), fitted with Plante accumulators during

1894-5, proved more successful. By this stage the running costs of overhead wire trolley systems of electric traction had been reduced to a degree which made further battery demonstrations unnecessary.

The NSW Railways' Board of Commissioners were willing to authorise expenditure of up to £5000 on the Waverley electric trials but this sum only proved adequate for the erection of overhead wire between the Randwick Workshops to Randwick Junction and Waverley. This route provided some 3.3km of track with grades of 1 in 18 and curves of 33 metre radius. Due to the 'cross country' location various tests could be conducted without interruptions to the trunk Sydney steam services, but it would not be possible to witness performances under heavy routine passenger loadings.

The three tramcars for the experiment were initially furnished at the expense of the Thomson-Houston Company and arrived in Sydney together with some electrical equipment during June 1890.

Initial interest in electric tramway propulsion by the NSWGT was expressed while the exhibition line was in operation in Melbourne during 1888. The Thomson-Houston Company considered the possibility of transferring the equipment to Sydney at the conclusion of the exhibition but its sale to the Box Hill company, and the rapid improvements made in electric tramway technology over the intervening 18 months, resulted in newer material being imported from the USA for the Sydney trials.

### Construction

On 12 May 1890 the *Sydney Morning Herald* reported that satisfactory progress was being made towards the electric tramway trials on the Randwick to Waverley line. The Randwick and Waverley Councils approved the erection of overhead wires in their areas while the Thomson-Houston engineer, Mr J. Mahoney said that the three tramcars were nearing completion in the USA and were expected in Sydney in two months time.

The equipment for the trial arrived in two batches. The initial material arrived on the RMS *Mariposa* on 28 May 1890 accompanied by Thomson-Houston engineer Mr Bailou. The remaining items, together with the three electric tramcars, reached Woolloomooloo on the RMS *Zealandia* on Thursday 26 June 1890. By this stage almost 1km of overhead wire had been erected along the 3.3km route.

The overhead suspension "differed from place to place with the state of the road". The trolley wire, located over the centre of the track, was

suspended from span wires linking each pair of roadside span poles located at 36 metre intervals. These poles were a collection of undressed ironbark, turpentine, grey gum and blue gum timbers to test the durability of each species. Although the trolley wire was suspended in a position which was later to be standard for the NSWGT electric system, in some places the wire was not fastened directly to the cross span wires but linked by triangular suspension to two longitudinal wires located one above each running rail and these in turn were held by the cross span wires.

From the trolley wire the current was transmitted to the car motors through an insulated metal fixed head trolley pole mounted centrally on an insulated trolley bridge located on the car roof.

To energise the electric line an Armington Sims high speed 300 rpm 120 hp steam engine was coupled directly to a Thomson-Houston generator of 80 hp capacity capable of generating power at a 500 volt potential. This equipment could not function at full efficiency as steam was usually provided by two locomotive type boilers (steam motor type) of 30 hp capacity each. These boilers were 1.05 metres diameter and 1.65 metres long between tube plates, which carried 101 x 45mm diameter tubes. The total heating surface amounted to 26.9 square metres and the grate area provided

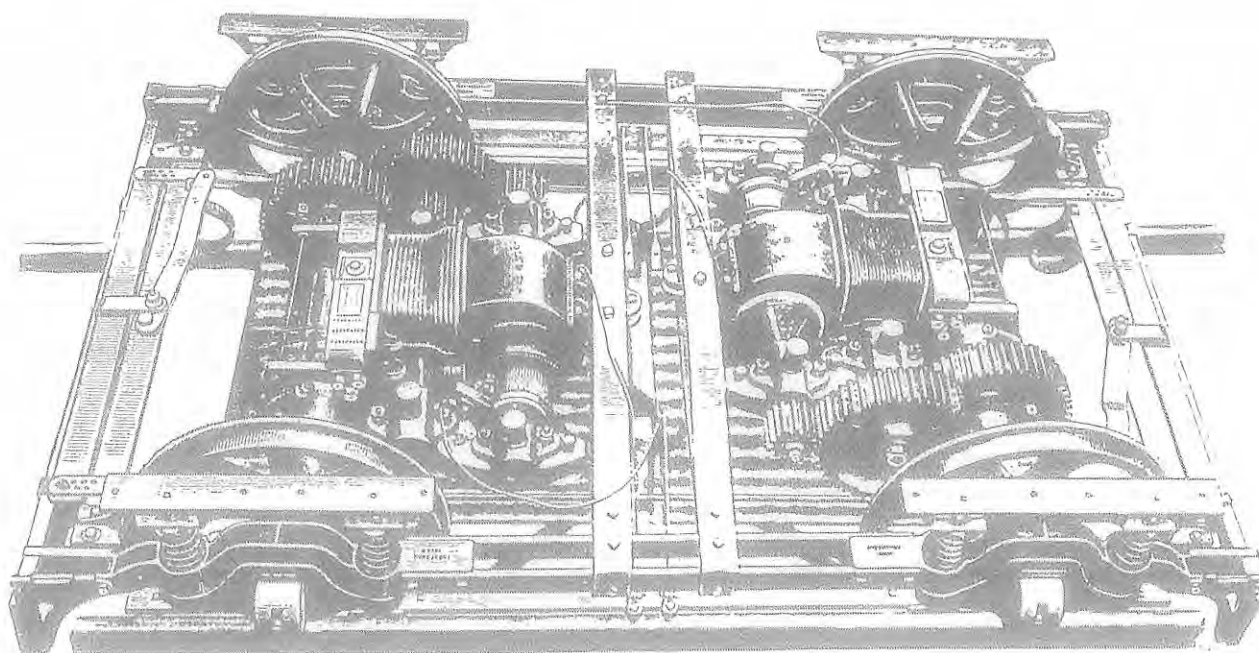
0.92 square metres of fire space. It is believed that the Randwick workshop steam plant was able to assist these two boilers when full capacity electrical tests at 550 volts needed to be conducted.

To house the plant and provide cover for a total of four electric cars a special building was erected at the Randwick steam tram depot. The main switchboard located within this structure carried an automatic circuit breaker, amp and volt meters, a voltage control rheostat and a lightning conductor. This equipment was supplied by the 'Thomson-Houston International Electric Coy'.

### Rolling Stock

The three electric cars provided for these initial electric trials were straight from the catalogue of John Stephenson of New York, being identical in body design to cars used by many of the electric operators in the USA during the the 1890s.

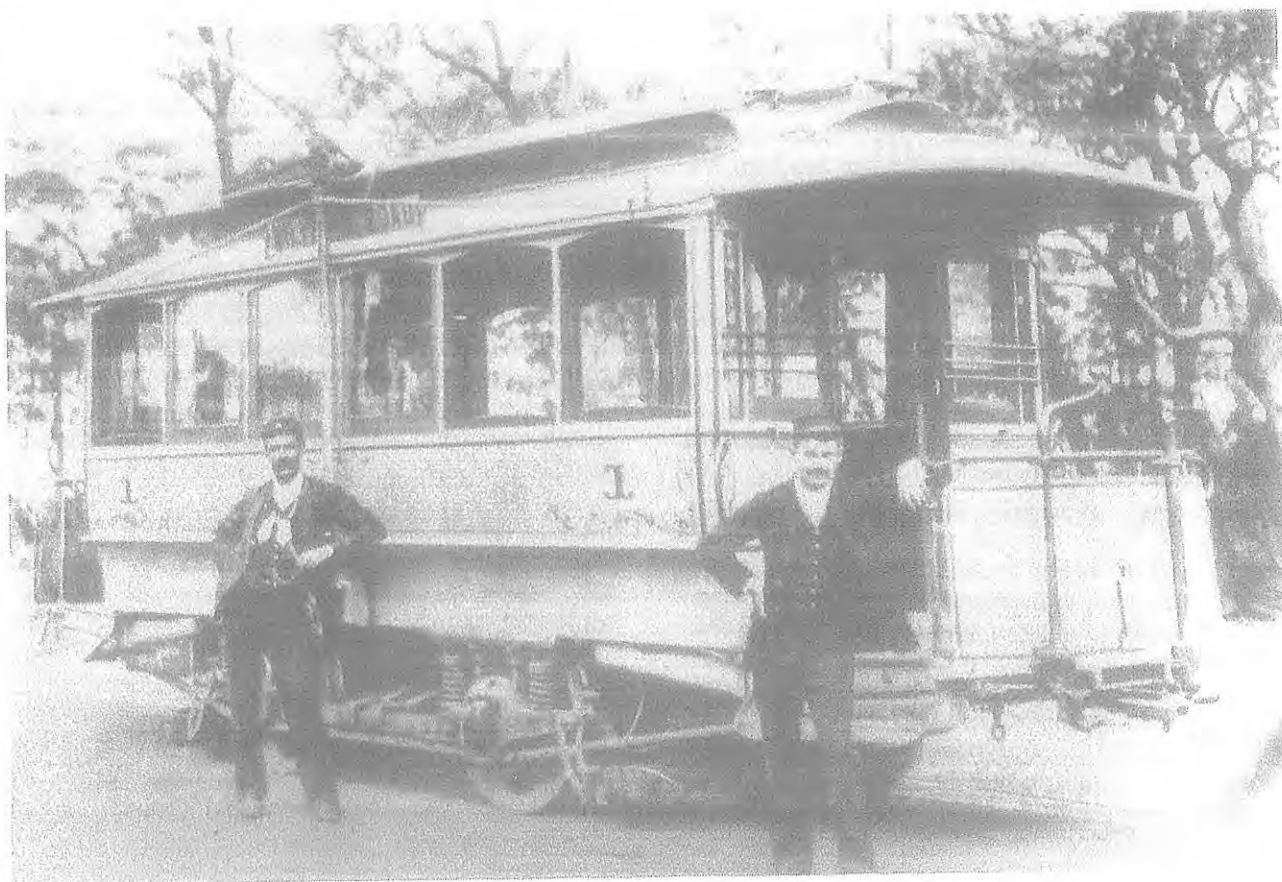
John Stephenson commenced manufacturing horse cars in 1832 and by the 1870s was constructing tramcars for customers throughout the world. His factory on 27th Street, New York saw many changes. During the 1890s cable and electric cars were leaving the plant at the rate of five per day and during 1904 Stephenson reached the pinnacle of his career when the cars



*Thomson-Houston Electric Co. tramway truck equipped with F-30 double-reduction motors, the first produced by the company that were equipped with the carbon brushes patented by Charles Van Depoele in 1888.*

C.B. Fairchild, Street Railways, 1892





*Electric car No. 1 at North Sydney after 1893. This tram is mounted on a Bemis No. 26 truck and still retains the primitive controller gear.*

K. McCARTHY Collection

for the first subway system in the USA were constructed by this firm. J.G. Brill purchased the plant in 1904 but continued production under the original name at Elizabeth, New Jersey until 1917.

Each of the Sydney electric cars were fitted with two 15 hp motors (but only rated as 10 hp due to the lower power in Sydney) which transmitted power to the wheels by means of open, double reduction gearing. This arrangement was necessary as only high speed motors could be manufactured at that period to fit between the axles under the car floor. The motors were of the Thomson-Houston F30 type having carbon brushes and a 'bi-polar' type of surface-wound armature. The armature, fields and gears were exposed to road dirt and water which resulted in noisy operation and high maintenance costs.

Contemporary technical descriptions of the equipment described these motors as having "a nominal output of 15 hp; the armature was smooth core, drum wound; resistance of armature was 1.93 ohms; total weight of motor without gears 1975 lbs (896kg); gearing ratio 6

9.4; speed of motor at 25 amps was 1000 revolutions per minute."

Not until the introduction of the Westinghouse No. 1 motor in the USA during July 1890 was it possible to obtain a fully enclosed mechanism with gears operating enclosed in a grease-filled case. In October 1890 the small Wenstom Company of the USA produced the first modern single gear set reduction tramcar motor and this forced the established firms of Westinghouse, Thomson-Houston and Edison-Sprague to hasten research and market similar motors during 1891.

The three Waverley electric tramcars, which carried numbers 1 to 3, were originally mounted on Thomson-Houston trucks constructed under contract by the Bemis Car Company of Springfield, Massachusetts, USA under the patents of Sumner A. Bemis. The trucks carried four wheels of 32 inches (812mm) diameter.

The power passed from the trolley arm cable to the main switch mounted under the roof canopy at one end and through an automatic switch behind the driver on the opposite end platform. From these switches the power cable

passed through a fuse box and a lightning choke to the single controller and resistance coils mounted under the car floor. These 'flat face' controllers were regulated through a chained sprocket mechanism actuated by the controller handle and shaft carried by bracket bearings on the end aprons. These functioned through the usual series and parallel connections and could be turned through one complete circle, less the thickness of the stop.

From the resistance coils, through the motors, the current returned to the Randwick Workshops power house by way of the wheels and rails. These rails were each connected to a buried No. 0 soft copper wire cable which ran parallel with the track to the powerhouse.

Two types of braking were available to the motorman; the hand operated wheel brake and the rheostatic motor brake. The interiors of the vehicles were illuminated at night by five carbon filament 100 volt incandescent lamps connected in series but all other illumination was provided by kerosene lamps. A large demountable kerosene headlamp similar to that carried by cable grip cars, was fitted on the front apron while two small interior bulkhead lamps, each with its own small chimney ventilator, threw a

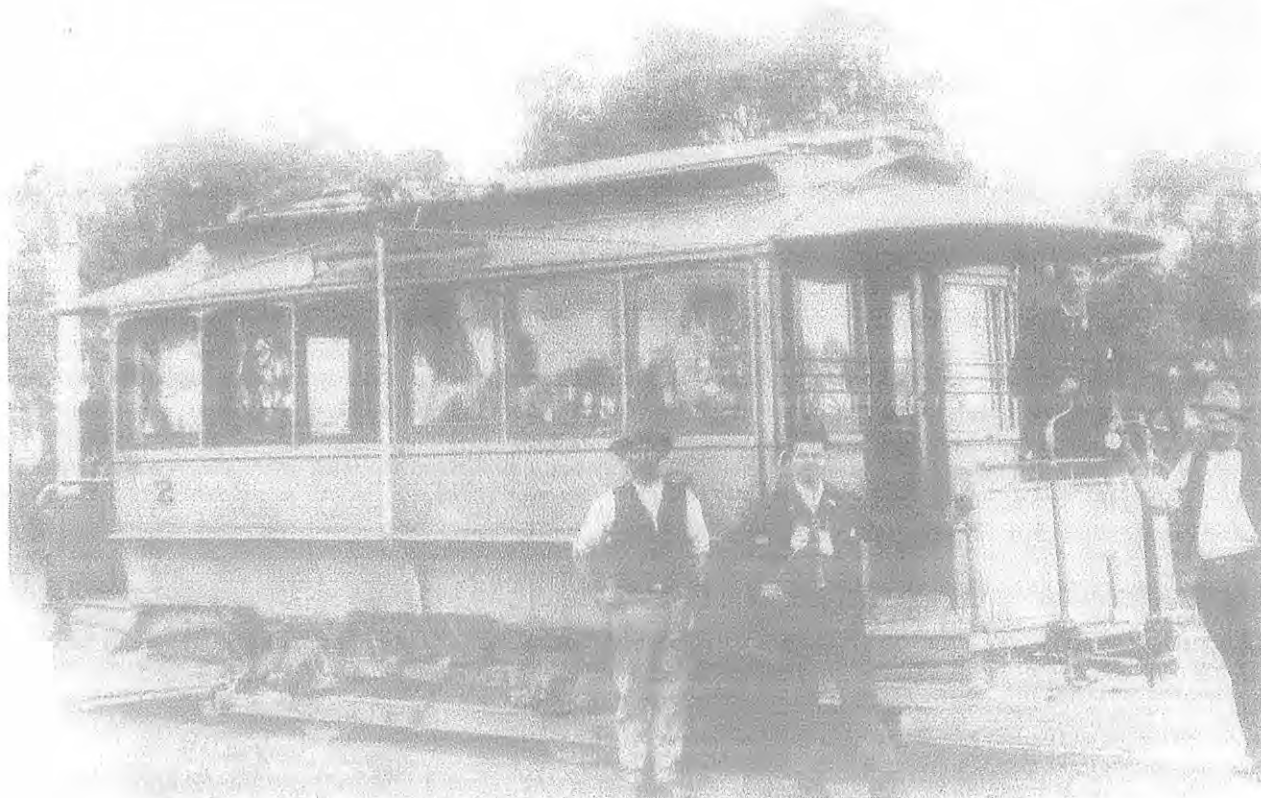
feeble light into the saloon and a red light outwards, when the trolley pole was off the wire at terminals.

Twenty-six passengers could be seated in comparative comfort on the interior longitudinal seats which were of laminated timber (plywood) pierced with ventilation holes and covered with Wilton carpet.

#### **The Thomson-Houston Electric Company**

Elihu Thomson and Edwin Houston collaborated in 1878 to produce a more efficient arc lighting system after Thomson had conducted experiments with, and made improvements to, the Brush system. To market and develop the Thomson Houston patents and techniques the American Electric Company was established in 1880. By 1882 Thomson felt that the company was not exploiting the patents efficiently so, with the backing of Boston businessmen, was able to establish the Thomson-Houston Electric Company at Lynn, near Boston, in 1883.

By 1885 the firm was successfully manufacturing and marketing complete arc and incandescent lighting systems while by 1886 production had expanded to include direct



*Stephenson electric car No. 2 at North Sydney in 1893. At this stage the tram still retained the original controller gear.*

L. GORDON Collection

current motors. By 1888 the Thomson-Houston Electric Company was able to supply complete electric railway and tramway systems.

Bentley and Knight established the first commercial electric street railway in the USA at East Cleveland in 1884. It operated on the conduit supply system located between the running rails. This one mile (1.6km) electric working closed after a year's operation due largely to the high cost of operation when compared with horse traction. The comparative efficiency of the venture, when compared with other forms of tramway traction, prompted the establishment of another experimental line in a Rhode Island factory which enabled Bentley and Knight's work to remain available for examination. In 1887 Bentley and Knight won the contract for a 37 car electric system in New York city and the Thomson-Houston Electric Company was the subcontractor selected to supply the motor and generating equipment. During 1889 the Bentley and Knight company was purchased by Thomson-Houston of Boston.

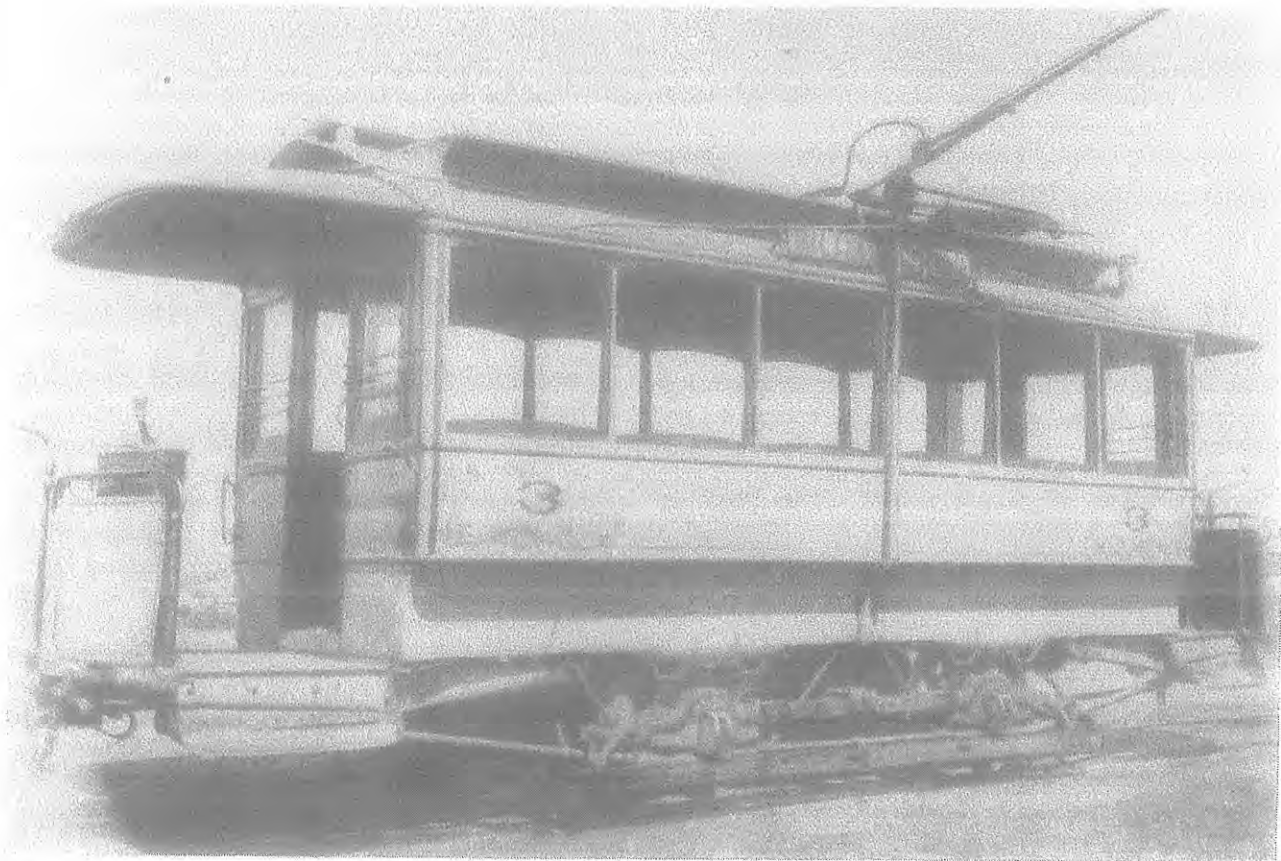
Earlier in 1888 the Thomson-Houston Electric Company had also purchased the growing electric tramway business of Charles J.

Van Depoele who had pioneered an electric line at the Toronto Exhibition in Canada in 1884.

The first installation of the Thomson-Houston Company electric railway system took place in July 1888 on the Lynn Railway in Massachusetts. The items displayed at the Melbourne Centennial Exhibition in 1888 were certainly early examples of the Thomson-Houston products as not until late in 1888 was similar equipment used in the USA.

The truck used under the Melbourne Exhibition car was constructed by the J.G. Brill Company with Thomson-Houston electrical equipment. That firm's archives state that this was the first electric truck constructed by Brill.

The pioneer electric traction firms of Sprague Electric Railway and Motor Company and Edison Electric Light Company merged to form the Edison General Electric Company and in 1892 Thompson-Houston joined to form the giant General Electric Company. Thus the best features of each firm were combined by the new GEC into their products at a time when the world wide change from animal and steam traction to electric operation of street railways was being initiated.



*The third of the Thomson-Houston/Stephenson cars on the North Sydney electric tramway, circa 1900. At this stage No. 3 had received the K type controllers and higher horsepower electric motors. The arrangement of the side mounted trolley pole is clearly seen in this view.*

Late C.B. THOMAS Collection





*Car 2 on the Military Road electric tramway in North Sydney circa 1893. The tram is still fitted with its original electrical gear. The unusual curved brackets on the span poles are prominent.*

R. MERCHANT Collection

This situation became closer to a monopoly when the General Electric Company and the Westinghouse Electric and Manufacturing Company organised a patent exchange agreement.

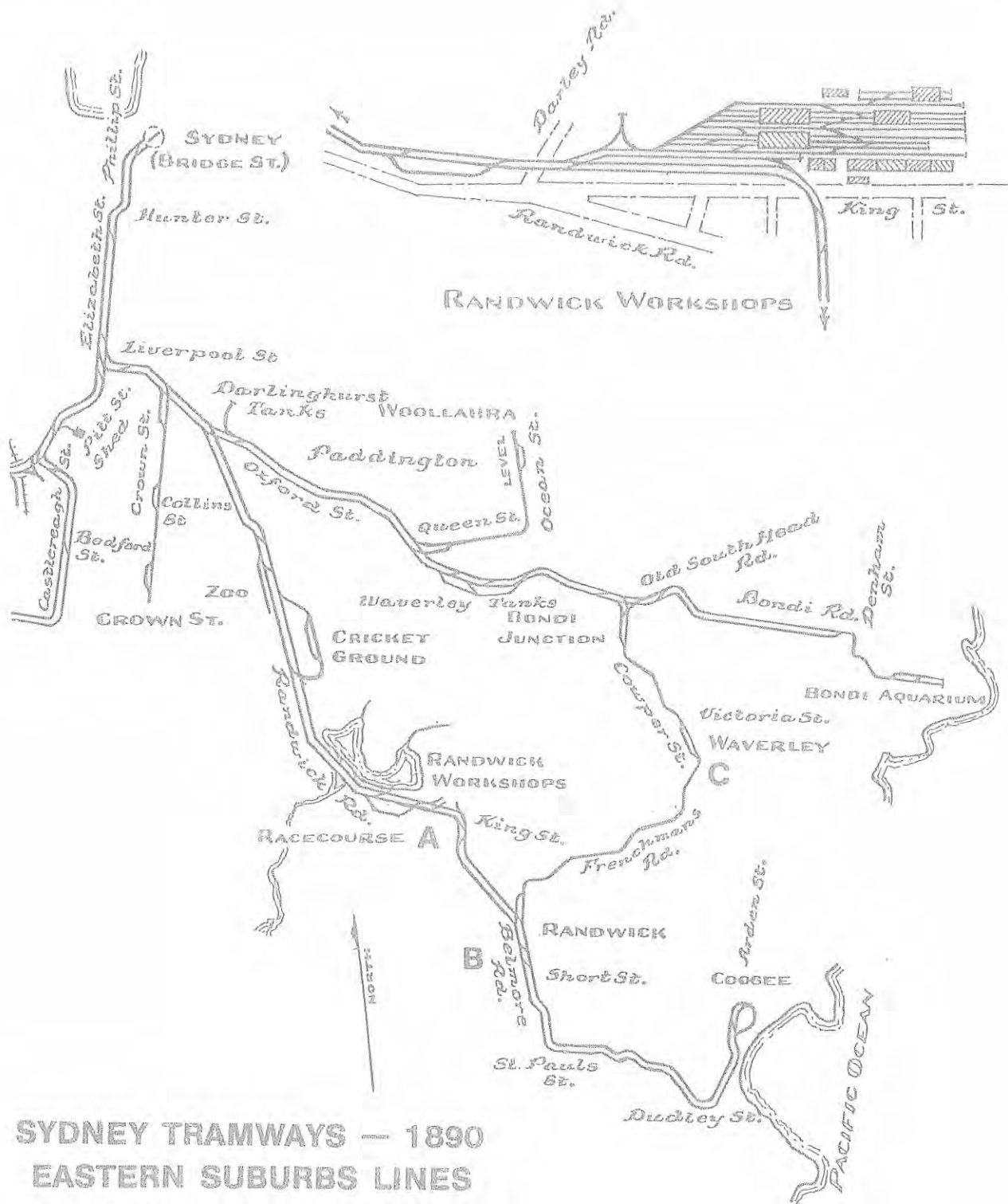
#### **Inauguration of Experimental Operation in Sydney**

The introduction of electric traction was alarming to some prospective passengers used to horse and steam operation on the city streets. At the Public Works Committee enquiry on 6 November 1890, Mr Mahoney stated that 600 miles (960km) of Thomson-Houston equipped electric tramways were in service in the USA while a further 400 miles (645km) were being currently constructed. He added that the current required to drive the car was not enough to kill a person. On 3 December 1890 the Hon. J.M. Creed asked the Vice-President of the NSW Legislative Council, the Hon. W.H. Sutton about the danger "by proximity of the electric machinery, to the watches of passengers

travelling by electric tram..." The reply that "every available information on the subject will be obtained" did not help to dispel fears in this matter.

The official trial of the new electric tramway at Waverley took place on Wednesday, 5 November 1890. A large party of tramway officials, members of the Public Works Committee on Tramway Construction, municipal officers and Thomson-Houston representatives departed from Bridge Street Yard in Sydney at 1.35pm on a special steam tram and transferred to two of the new electric cars at Randwick Depot at 2.00pm. The party was "propelled with great steadiness up and down hills and around the severe curves" at 12 to 16 miles per hour (20 to 27 kph) on the level and at 8-1/2 mph (14 kph) on steep grades. The drivers easily controlled the cars and "the merest tyro could learn the duties in a few moments". The trial proved a complete success, but due to the large crowd in attendance a thorough investigation of the workings could not be conducted.





The tramway was electrified between points A, B and C.  
 The line between points A and B was for depot working only.  
 Passengers were carried over the tramway between points B and C.

The electric service opened to the public on Sunday afternoon 9 November 1890 and during the following day, a public holiday to celebrate the Prince of Wales' (later King Edward VII) birthday, heavy traffic of curious passengers was conducted by the electric cars over a usually lightly patronised route.

On Wednesday, 12 November 1890 a more serious trial than the junket undertaken on the previous week was conducted on the electric line by the members of the Parliamentary Public Works Committee on Tramway Construction, Professor Threlfall of the University of Sydney, and Mr Musgrave Fischer, Assistant Engineer of the Tramway Department under the direction of Mr J. Mahoney of the Thomson-Houston company. This trial, to demonstrate the power and speed of the system, commenced at Randwick Depot at 1.30pm. One 4 ton electric car loaded with passengers hauled a 5 ton bogie steam tram trailer to Waverley without difficulty and returned as a single unit at considerable speed. After this practical demonstration the party inspected the Randwick powerhouse plant and no doubt returned to Sydney well pleased with the results.

On the day of this trial the Colonial Treasurer stated in the press that the electrification of the

line had been carried out by the Thomson-Houston Company of Boston for the Railway Commissioners and the engines, cars, motors, etc., had been purchased from the firm for about £9000.

The ownership of the tramcars, which were originally provided by the Thomson-Houston Electric Company for the trials, was still unclear in the NSWGT Annual Report for 30 June 1891 as a discreet blank appeared in the table concerning the number of electric tramcars in service. In the 1892 report this same table listed three electric cars under tramway ownership for both June 1891 and June 1892.

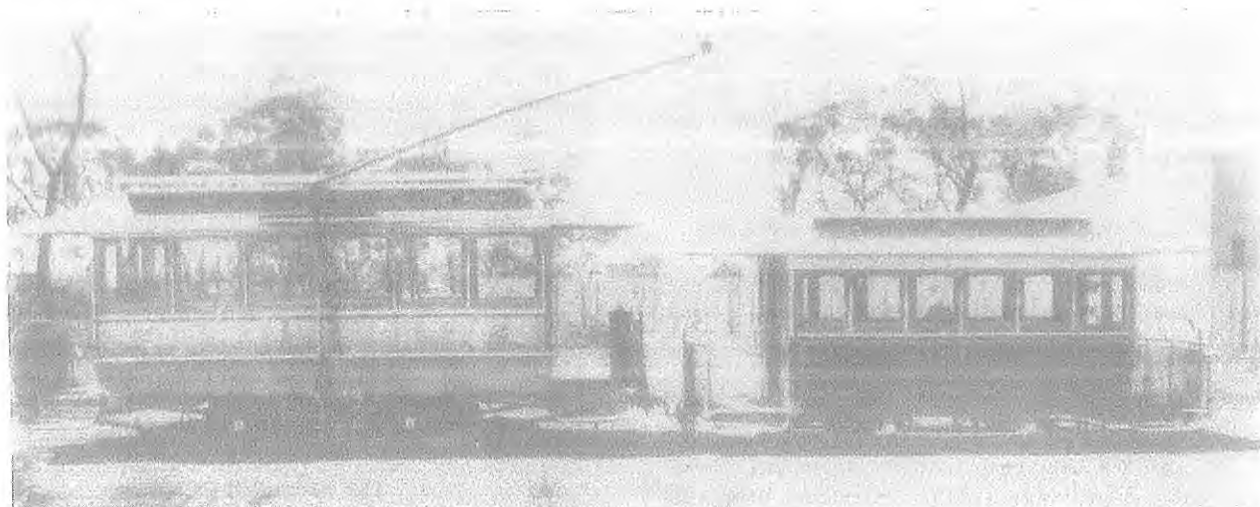
#### Operation of the Waverley Electrical Experiment

The three electric cars were available for traffic on the Waverley to Randwick tramway for a period of about 17 months. Initially some trouble was experienced with the steam plant but this was soon corrected. From time to time both minor and major faults caused delays in the service but few of these were of lengthy duration and the proximity of the Randwick steam tram depot made it a simple matter to replace the electric vehicles on these occasions.



*Thomson-Houston/Stephenson electric car No. 2 on the North Sydney tramway circa 1900. The side mounted trolley pole is still in use but more modern K type controllers and higher powered motors have been fitted.*

D. O'BRIEN Collection



*Electric car 2 hauling North Sydney cable trailer No. 1 on the Military Road electric line circa 1900.*

Late C.B. THOMAS Collection

Considering the pioneer nature of the experiment the electric operation at Waverley proved a mechanical success. In that environment, however, the fact emerged that it was more economical to operate the service with steam trams. The conventional steam vehicles could work the service at an average cost of 13.68 pence per mile while the electric vehicles amounted to 16.46 pence per mile. This difference in costs proved too extravagant at that juncture. Until 1890 the Colony had suffered a prolonged drought which was followed by extreme flood conditions; this produced an economic recession in a country dependent on its primary industry. Added to these problems was a period of industrial unrest (from which emerged the Australian Labor Party) while the London money market cut off loan funds to Australia as a result of the land and company 'boom and bust' which caused many investors to be satisfied with a 1/4 penny in the £1 (1/960th) compensation after the land sharks and the boom companies were wound up and their assets sold. So on 20 April 1892 the experiment concluded and steam trams returned to the route.

During the eight months from November 1890 to June 1891, the electric cars carried 132,240 passengers yielding £575. During the same period of the previous year/s the steam trams on the service carried 86,570 and received £407.

Comprehensive details of the electric operation on the Waverley extension line can be summarised as follows:

<i>Operation Details</i>	<i>Costs — Steam</i>	<i>Costs — Electric</i>
Steam November 1889 to June 1890	£1423	—
Electric November 1890 to June 1891	—	£1796
Anticipated steam July 1891 to April 1892	£1915	—
Electric July 1891 to April 1892	—	£2459

During 1908 a correspondent described as 'Pioneer' presented some reminiscences in the *Recorder*. "Old No. 1, the first electric car, was called the 'rheostat car'. There were no controller cases on it at all. There were two brake handles, the reversing handle was placed in the left hand handle and you kept turning the handle until it came to a stop, then you had full speed. When you wanted to stop you would rewind again. This winding would work an arm 2 feet (60cm) long under the corner of the car round a half circle contrivance. No air brakes, only hand brakes.

"With this car you would want plenty of fuses in your pocket because just underneath the side of the car there were two naked wires, and when the the car would begin to bounce the two wires would touch each other with the result the car would 'prop' and bang would go the fuse.

"If you found it necessary to cut out a motor at any time this was done by breaking the leads off the defective motor. The first electric drivers in NSW were William Phillips and Jimmy Russell. Both were gripmen on the cable line at North Sydney before going to Randwick. They were selected as electric drivers because of their youth and were given six months tuition by the

American experts who brought the system to Randwick. A self storage car (the Plante battery car No. 197 of 1894-5) was run by Driver C. Kendall but this was found to be too expensive."

#### Closure of the Waverley Experimental Line

Although the electric line officially reverted to full steam tram operation in April 1892, a press report of 5 October 1892 throws some doubt on this date. A return dealing with the operating costs of the electric tramway was published and read:

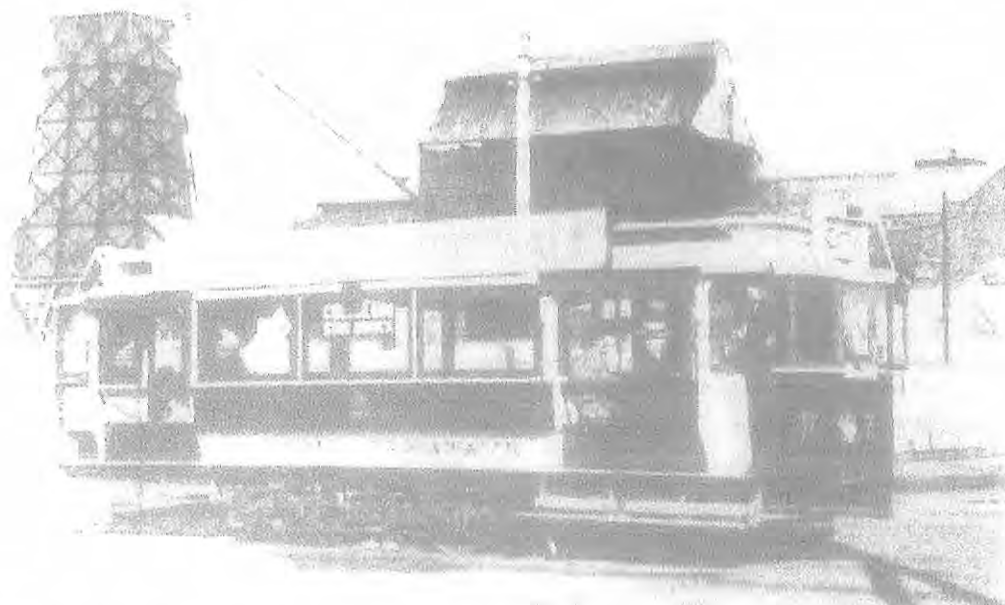
"Ten men are engaged per day at present on the electric system". No other references, however, have been discovered to throw further light onto this query.

The same report of October 1892 revealed some interesting figures on the trials. The expenditure on account had amounted to £10,110, while expenses on repairs had reached £954. The relative costs of electric versus steam operation were respectively £2909 and £2302 per annum. The electric trams were able to travel at 15 mph consuming 2 tons 18 cwt (3 tonnes) of fuel per day. In comparison with the ten men required on the electric undertaking the steam working on the same route to an identical timetable only needed seven men and a fuel consumption of 13 cwt (0.66 tonnes) of coal per day.

#### Transfer to North Sydney

During October 1892 a contract was let for a tramway to be constructed from Ridge Street on the North Sydney cable tramway to Mosman along Military Road. This extension was planned as a steam tramway but the firm of H.H. Kingsbury was engaged to dismantle the plant along the Waverley tramway and re-erect it at North Sydney. The *Tramway Contracts Register* reveals that H.H. Kingsbury dismantled and re-erected the overhead wiring for a cost of £200 while several abrupt curves on the track were eased and the overhead wiring extended from the Falcon Street and Miller Street intersection to the Ridge Street cable car sheds for an additional £92-17-11. The contract register shows the job as being completed on 14 September 1893 while the contract was not officially awarded until 17 November 1893! This could possibly indicate that H.H. Kingsbury carried out the transfer and re-erection at their own cost with payment being made after a three month trial period.

At 5.55pm on Tuesday 19 September 1893, a trial trip was conducted with the electric tramway using one of the three former Waverley cars in charge of Mr G.F. Clements of the Electrical Engineering Branch of the Railways Department. Public operation commenced on the following morning and from this small beginning Sydney was to be served by electric tramways for the next 67 years.



One of the former Sydney experimental electric cars in Ballarat circa 1920. The three former Sydney cars carried numbers 2, 5 and 7 of which number 2 appears in this view. At Ballarat the firm of Duncan and Fraser converted the enclosed saloon cars to the California combination body style while the six side saloon windows were reduced to three.

Late W. JACK Collection



# RIDING ON TOP OF THE CAR

## Sydney's Double Deck Electric Cars

By V.C. Solomons

For the financial year ending June 1900, the first year during which electric trams were introduced onto the main city system, and June 1906, the passengers carried increased from 63,500,000 to 137,200,000 per annum. Trams of increased capacity rather than additional vehicles were required to handle this continuing expansion.

Due to the close track centres and restricted loading gauge, the largest tramcar able to operate on the Sydney electric routes at that time was the 70 seat N type cross bench car which was 8ft 6in. wide across footboards and 37ft 6in. long.

Three solutions were available:

- a. Increase the capacity of the tramcars within the existing loading gauge by the use of double deck vehicles.
- b. Increase the size of the loading gauge by major track relocations.
- c. Construct tram tracks along more city thoroughfares.



*Mr. H. McLachlan, Secretary for Railways.*

The first option was the least expensive and this initiated the double-deck electric tramcar experiments and trials in Sydney during 1907. These trials are related in this article.

The cheapest option, however, did not prove successful, and the Tramways Department reached the decision to increase the loading gauge in 1907 which cleared the way for the introduction of the larger 80 seat O type tram in 1908.

The tramway authorities were thus able to avoid the construction of major relief routes along further city streets until the 1920s... The growth of city traffic was finally arrested with the opening of the city underground railway from Central to St James in 1926 and Wynyard in 1932.

\* \* \* \* \*

Between 25 March 1907 and 17 January 1908, two four-wheeled C class electric trams of the NSW Government Tramways operated in Sydney as double-deck electric cars. The two cars were numbered 33 and 82 in the Sydney fleet and were built by Hudson Bros in 1898 and Clyde Engineering Co. in 1899 respectively.

The C class trams were small, single-truck, end-loading saloon cars which were built for the pioneer electric lines at North Sydney, Rose Bay and along George Street, Sydney. In all, 97 C class cars were built with a variety of body variations.

On 6 February 1906, the Secretary for Railways, Mr H. McLachlan, wrote to the Tramways Electrical Engineer, Orlando W. Brain, and Tramway Traffic Superintendent, John Kneeshaw, requesting them to investigate and report to the Railway Commissioners on the question of the introduction of double deck cars. The Chief Commissioner wished to know whether it would not be practicable to make an experiment either by building a double deck car, or converting some of the existing cars to double deckers, using them as trailers. Their use as trailers would "avoid entirely the difficulties that would have to be met with the (overhead) wiring and any other difficulties that might arise in consequence of the height of the double car".

Mr Brain directed a memorandum to the Secretary on 13 August 1906 in which he advised the only car that could be equipped with a double

deck without excessive weight on the axle would be the enclosed four-wheeled (C class) car, either as a trailer or a motor car coupled to another motor car which could carry the trolley pole for both motor cars. He estimated that the cost would be £140 for an open deck or £180 for a glazed-in upper deck. He further advised that, as the platforms were so short, the stairway would not be very satisfactory and it would be necessary to lengthen the platforms at an additional cost of £35.

In a joint submission on 15 August 1906, Messrs Brain and Kneeshaw elaborated on the proposal. Both men felt that no great difficulty would be experienced in converting and operating a few trail cars, but the experiment would necessarily be of a limited nature as there were only a few ways in which trail cars of such height and carrying capacity could be utilised.

Mr Brain felt that where two coupled motor cars were run on Railway to Circular Quay service, one of the cars might consist of a double deck car. This would enable motor power to be provided under each car and only one pole would be necessary on the single deck car, thereby overcoming the need to raise the overhead wires if a pole was placed on the double deck car. He considered it advisable that the double deck car be run in the trailing position. Both men were of



*Mr Orlando W. Brain MIEE, Tramways Electrical Engineer.*



*Mr John Kneeshaw, Tramway Traffic Superintendent.*

the opinion that it would be found necessary for the upper deck to be glazed-in.

As a consequence of this submission, the Commissioners granted approval on 20 August 1906 for two cars to be altered as proposed and tried on the Dulwich Hill line.

The Chief Commissioner inquired as to the cost of increasing the seating capacity of the proposed double deck cars. The Electrical Engineer reported on 23 August that the only means by which this might be done would be by putting cross seats on the top of the car, at an additional cost of £50, making the total cost for an enclosed upper deck car £263. It would be necessary to reduce the lower saloon floor-to-ceiling height from 7 feet 7 inches to 7 feet, and increase the total height of the car from 16 feet 3 inches to 16 feet 5 inches, which would not, however, affect the question of the trolley wire. By this means the seating capacity would only be increased by two, or at the most four passengers, bringing the total up to 56 passengers. Brain pointed out that this arrangement had the advantage of permitting passengers on the upper deck to face forward instead of sitting sideways, "as the latter may lead to some public criticism and unfavourable comparison with the double deckers elsewhere".

The Commissioners replied immediately that the additional seats did not warrant the additional expenditure.

The Traffic Superintendent wrote to his Electrical colleague on 14 September 1906 advising that the retention of the 'Lantern Roof' in the conversion rendered the 'back to back' seats necessary on the upper deck and also limited the space between the seat and the window. He felt that, in these circumstances, only the saloon should be enclosed, which, he noted, "seems to be the practice with four-wheeled cars". It would provide the conductor with more freedom of movement, keep passengers away from stair heads, and reduce the pitching movement of the car. He suggested drop sashes should be provided to all windows in the upper deck sides and these be fitted with blinds. The bulkhead glass could be fixed between the end doors.

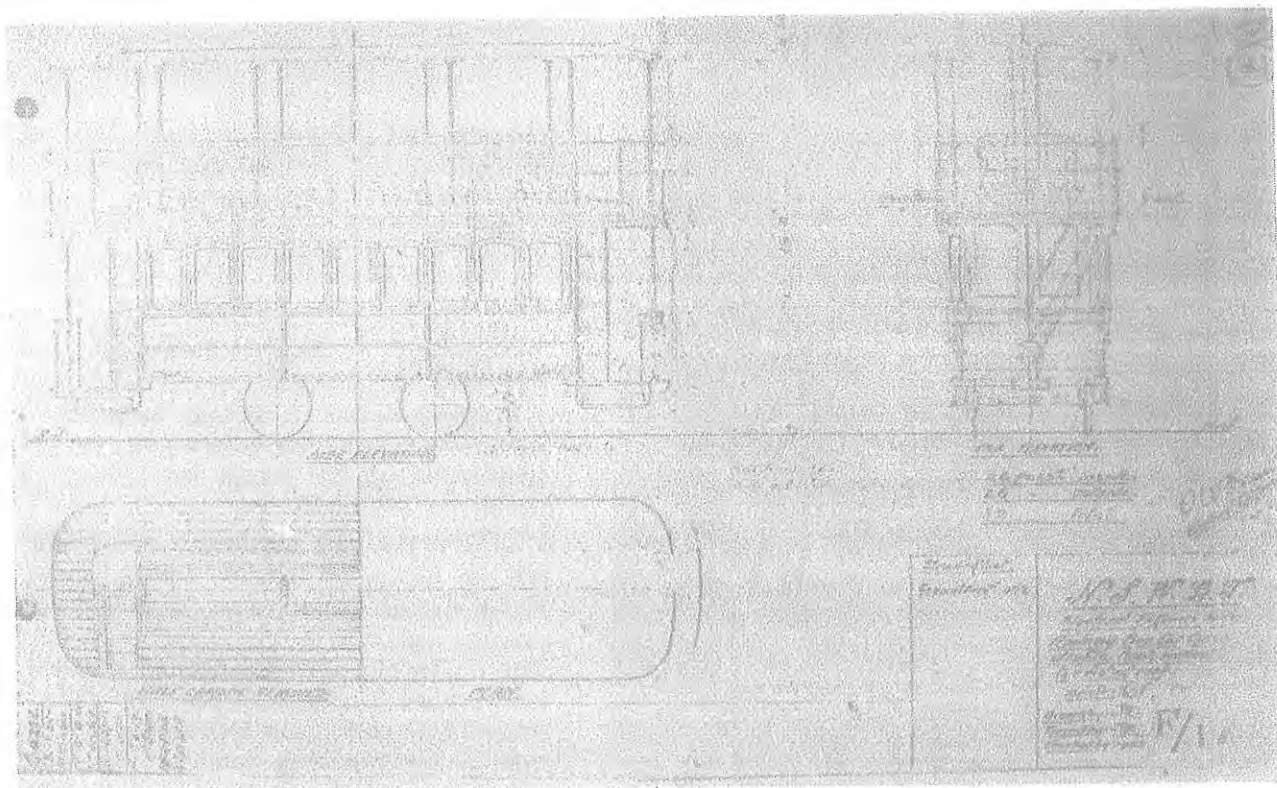
In a further memo to the Commissioners on 18 September, the Electrical Engineer advised that the weight on the axle would be excessive if any other type of car other than the four-wheeled enclosed type were made a double deck vehicle. He further advised that by a modification with cross seats, the total car seating capacity could be brought up from 56 to 58. However, he was

unable to reduce the increased cost of £263 per car previously advised. He also pointed out that the clearance between two double deck cars with longitudinal seats passing in Lower George Street would be 14-1/2 inches between side pillars. By adopting cross seats on the upper deck with a 19 inch wide centre aisle, the clearance between the cars would be increased to 17 inches. However, as the cross seat car would be 5 inches higher than the longitudinal seat car, it would be necessary to raise the trolley wire in places on the Dulwich hill line at a cost of from £15 to £20.

The Commissioners approved Mr Brain's suggestions on 24 September 1906.

On 13 October, the Electrical engineer forwarded a blueprint of the proposed alterations to the C class car to convert it to a double decker. He pointed out that the bulkheads on the top deck should be in line with those on the lower deck as the stanchions at the end of the car would not be satisfactory for carrying the weight of a fully enclosed top deck. The lower platforms also were not built to support so heavy a weight at the ends of the car. The five wide glass frames on the top deck were made to drop when required. The Commissioners approved the proposed alterations two days later.

The Traffic Superintendent advised on 18 December that the double deck cars would be



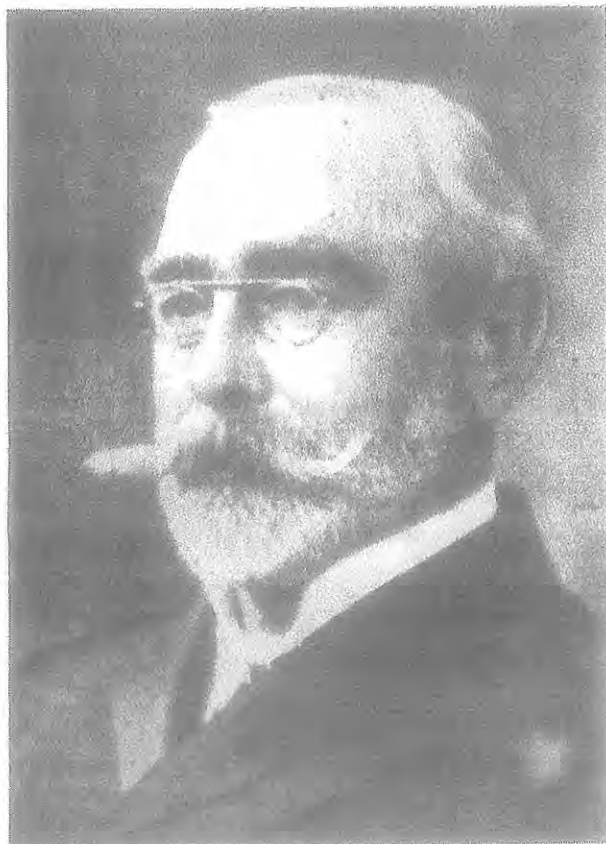
*Tramways drawing showing the 'Railway Box Car conversion to double deck without alteration to the existing roof.' This proposed conversion had an open top deck with longitudinal seating.*



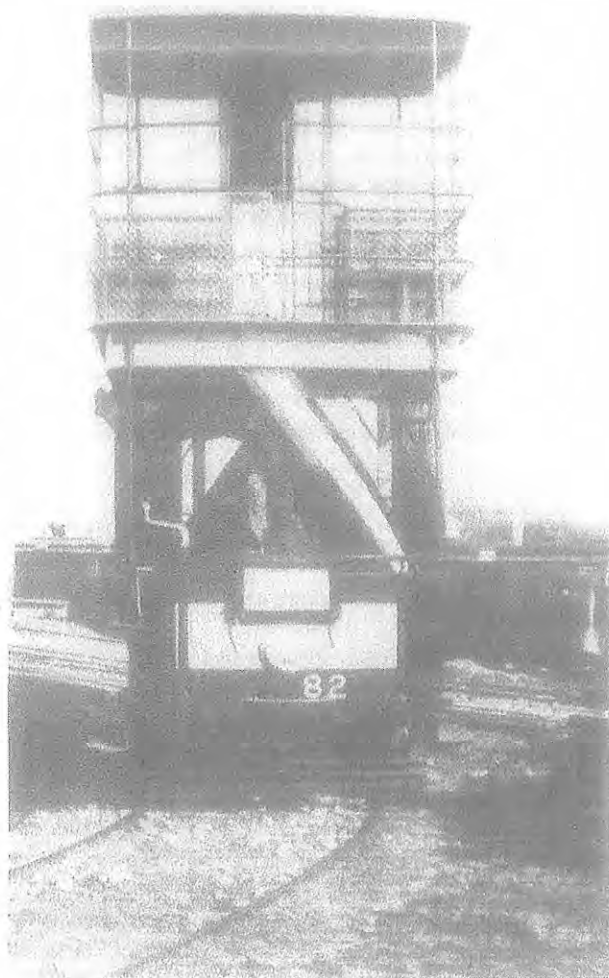
stabled at Newtown Depot, but may occasionally be run to Fort Macquarie Depot.

The *Daily Telegraph* feared that the experimental cars would take too long for passengers, particularly ladies, to come down the steps in order to leave the cars. "Certainly the ordinary time now allowed will not be sufficient, but in view of the lightning speed shown by some conductors in starting a car from a stopping place, that fault will perhaps not be a serious one. They will be compelled to wait a reasonable time with the double decker".

Mr Kneeshaw informed the Commissioners on 8 March 1907 that he had been advised by Mr Brain that one of the double deck cars would be ready for trials during the ensuing week coupled to a four-wheeled enclosed (C class) car. He was of the opinion that the best line on which to test the car would be between Circular Quay and Enmore via George Street. The Commissioners approved this alteration to the test route. Double deck car 82, coupled to C class motor car 93, entered service on 25 March 1907 on Run 424 from Circular Quay to Enmore, under the control of Driver Porter. Double deck car 33 and its accompanying motor car 92 entered service the same day. Starter Owen at Circular Quay reported that the cars were running four minutes to eleven minutes late at the Quay, "caused by



*Mr Charles Oliver CMG, Chief Railway Commissioner.*



*Driving end view of car 82 at Randwick Workshops.*

GOVERNMENT PRINTER, R.I.M. Colln.

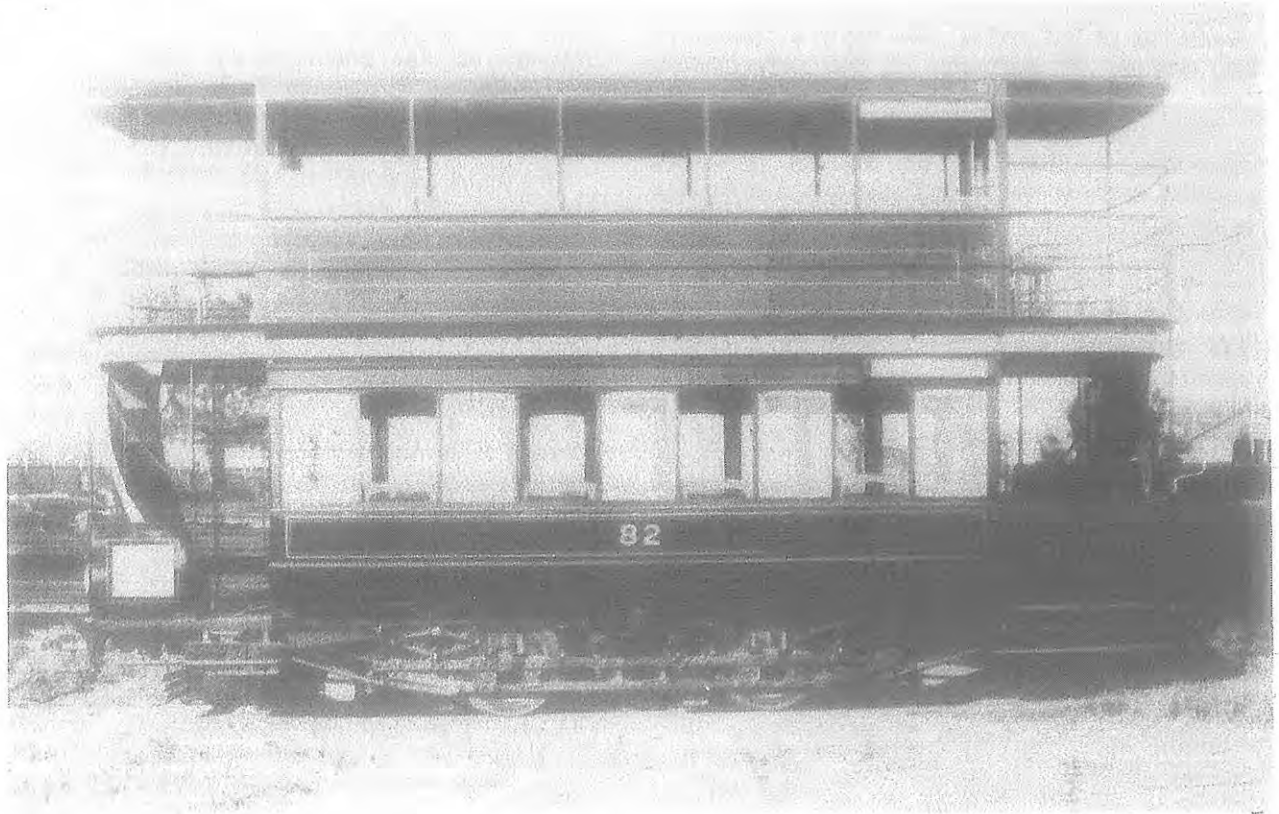
overloading of double deck car on top, passengers all make to get on top".

In response to a request from the Traffic Superintendent, Mr Brain forwarded the following information on 26 March for inclusion in the weekly notice to staff:

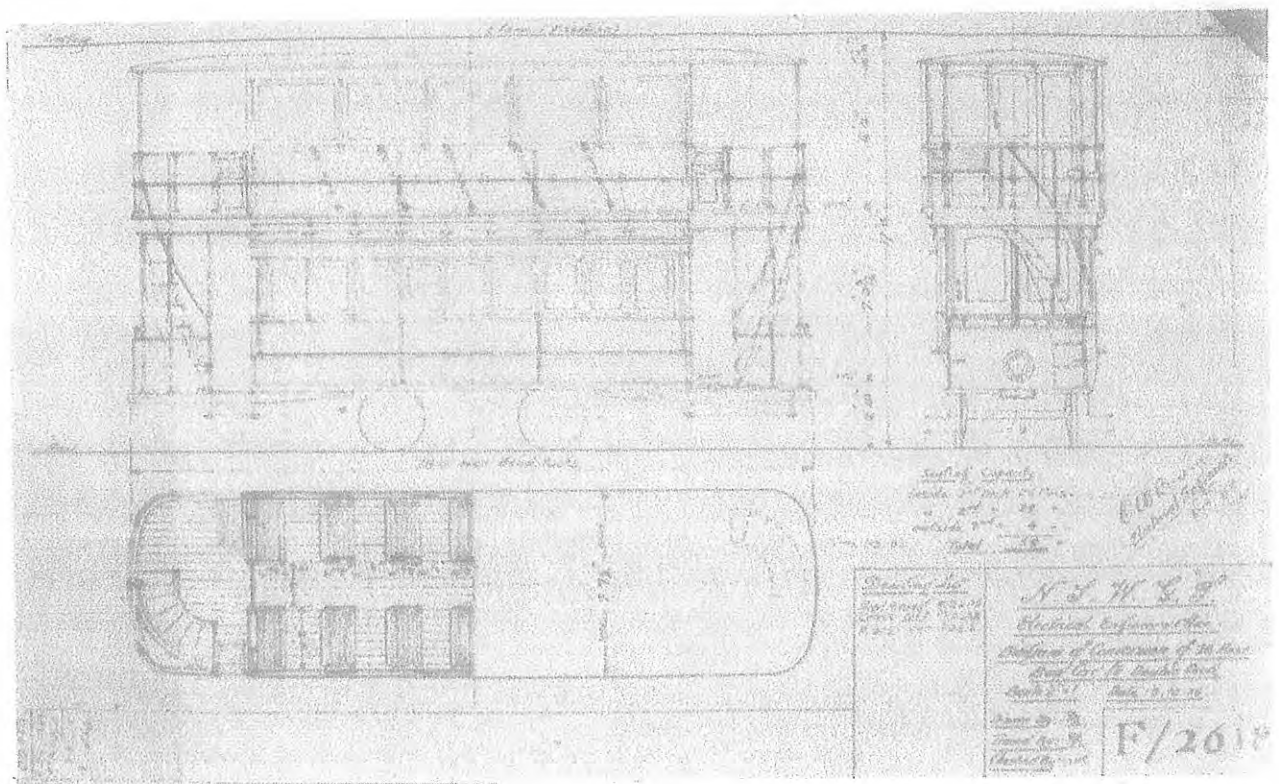
"The motor cars attached to the double deck cars are similar to ordinary coupled motor cars. The double deck cars are not fitted with automatic switches and fuses but the automatic switches and fuses on the No. 1 ends of the cars attached are in circuit when driving with the controllers on the double deck cars. Care should be taken that the main power couplings under the canopy of the single deck cars are fastened by the straps when the cars are in traffic".

The congested tram traffic was the subject of a item in the *Daily Telegraph* on 1 April 1907. It gives an interesting insight into tramway traffic





Official photo of car 82 at Randwick Workshops taken on a full plate glass negative.  
GOVERNMENT PRINTER, R.I.M. Colln.



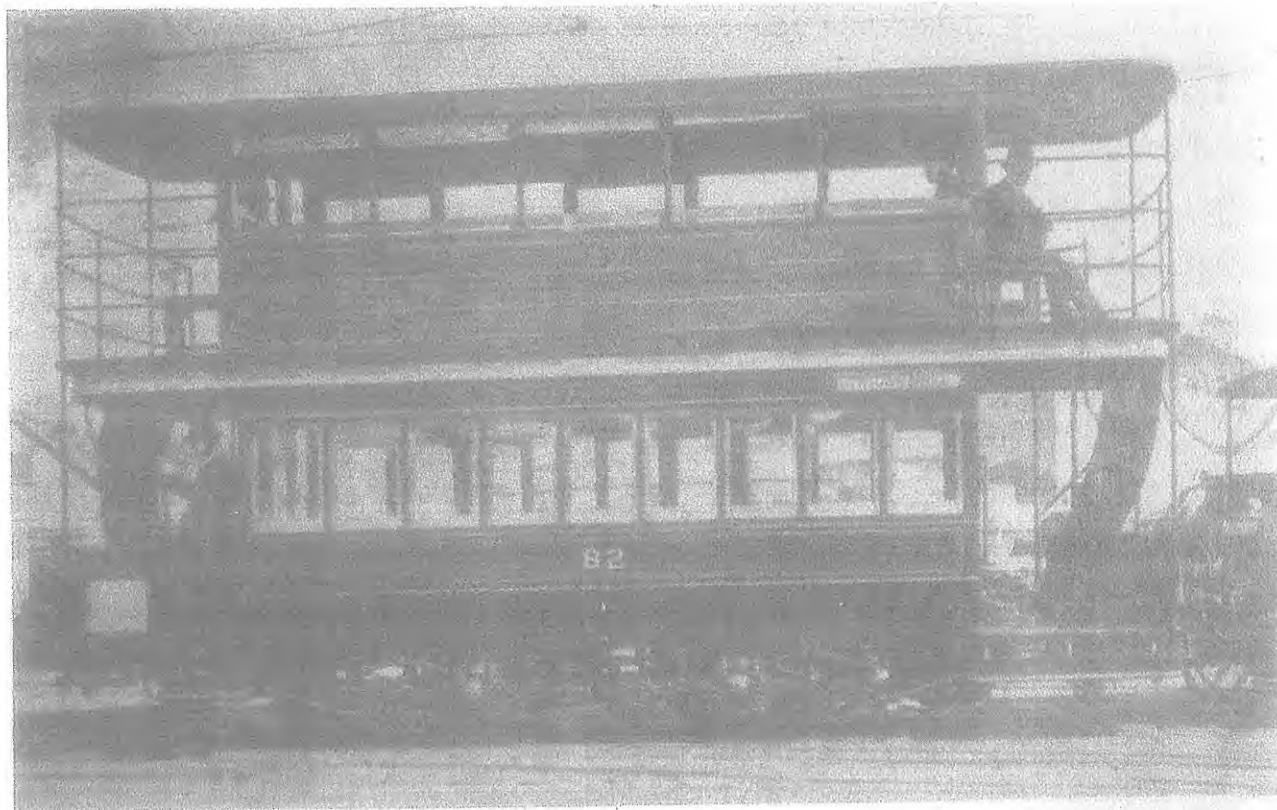
Tramways drawing No. F/2618 shows the conversion of the 26 passenger Box (later C class) to double deck with cross seating on the upper deck.

conditions of the period, and the first opinion of the success or otherwise of the experimental cars:

"The tram traffic is becoming more and more congested, at least in the thickly populated suburbs and especially to Newtown. During the busy hours of the day every Newtown tram is crowded, sometimes dangerously so, many passengers being unable to find seats in the cars, and often having to stand on the footboards. How this congestion may be prevented is a difficult problem to solve. The commissioners have endeavoured to do so by returning to the old system of double-decked cars. The carrying capacity is thereby increased without the ordinary cost of additional rolling stock. It seems doubtful, however, whether the effort will prove successful. The experiment has been tried for about a week, the double-decked cars being put on the line from Circular Quay to Enmore. Traffic along this route being always very great, it was well suited for the trial, especially during the busy holiday season. Experience, however, shows that there are serious drawbacks to the system. Observers have noted that on the trams having a double-decked car, the journey from the Quay to the Enmore terminus occupies about 10 minutes, or one third, more

than the ordinary time. The time needed forgetting on and off the double-decker makes the stops much longer. This is caused in some measure by the stairways being often crowded, hindering free access and exit; but even when this is avoided the extra delay must still be considerable. During the past week the upper part of the cars were well patronised, the novelty and improved view obtainable no doubt attracting many; but the general opinion seemed to be that the top deck is by no means as comfortable for riding as the lower one. there is a deal of oscillation, making it almost impossible to read, a habit common amongst many tram passengers. The greater length of the journey and other disadvantages will, it is thought, prevent the double-decked cars becoming popular."

Chief Traffic Inspector Herrman wrote to the traffic superintendent on 13 April 1907, giving an official view of the first two weeks' operation of the converted cars. During this period the cars were out of traffic four whole days and two half days. Mr Herrman felt it inadvisable to use the double deck cars on busy Saturday night and Sunday traffic when delays were caused by the cars "being continually overloaded by curiosity travellers." He went on to state that for the first



*Another view of car 82 at Randwick Workshops with tramway officers posing as passengers. It is coupled to its motor car, No. 93, just visible at right.*

V.C. SOLOMONS Collection



*A double deck C class car leading its single deck partner along George Street at Park Street. The two-car set is passing the Town Hall, outbound from Circular Quay. This is portion of a postcard published by the New South Wales Bookstall Co.*

R.I. MERCHANT Collection

week the cars ran up to 19 minutes late, losing from 6 to 11 minutes during crush traffic, and it was necessary to prevent passengers standing on the upper platforms and stairways. This enabled the cars to keep good time and, in fact, to keep to the scheduled time. Mr Herrman noted that during the time the cars were in service, adverse comments had been made on their unsteady riding. He also had noticed the fore and aft motion which was similar to the action of the steam-hauled double deck cars which had generated public complaints. He felt that this movement was not so noticeable in the single deck cars.

Mr Herrman's concerns were subsequently conveyed by the Traffic Superintendent to the Commissioners in a memo dated 22 April 1907. In that memo, John Kneeshaw reported that the double decked trail cars were put into traffic on 25 March and "have continued up to date, car No. 432 being off the run 2 days and car No. 434 off for 5-1/2 days for repair or overhaul purposes." His reference to the two double deck sets by their run numbers would indicate that the cars ran the same run each day, each making thirteen round trips if the full run was completed. Double deck car 82 and motor car 93 operated on

run 434 as mentioned by Starter Owen, so double deck car 33 and its motor car 92 must have operated run number 432.

Mr Kneeshaw went on to say that although the cars ran very late for the first few days during the crush loading in the evening, the staff and the public had become more familiar with them and they were keeping better time. Lost time from two to three minutes was still occurring on busy trips, particularly between Circular Quay and City Road junction where the double decked cars ran as much as two blocks behind the tram in advance. He attached returns showing the number of minutes late or early the cars were at the Cleveland Street bundy clock.

On 6 May 1907, the Traffic Superintendent had an interview with the Assistant Railway Commissioner and advised the Secretary for Railways that arrangements were being made to run the double decked cars between Central Railway Station and Enmore during the busy traffic each evening, and they would be withdrawn from ordinary traffic in George Street during the remainder of the day. He advised the Secretary on 12 May that the cars ran two trips each evening between Enmore and the Railway, and that the loading was fair. Even in this service the





*Two views of haulage car 33s at Randwick Workshops. The multi-pin power sockets on the apron of the coupling end for the double deck car are clearly visible in both these views.*

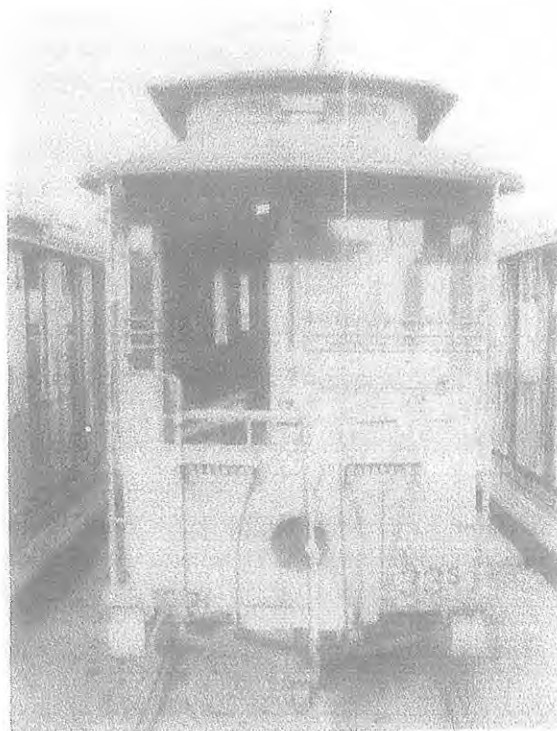
Top: D. STEWART, N.L.C. Colln.  
Bottom: V.C. SOLOMONS

trams lost from 2 to 4 minutes on the outward journey, thereby to some extent interfering with the other trams which were following.

Mr Kneeshaw recommended to the Commissioners on 28 October 1907 that both double deck cars be converted back to single deck cars. In support of his request, he stated that the cars caused interference with ordinary trams owing to the extra time taken to load and unload passengers at stopping places, and that they had limited use over the system due to the insufficient height of the trolley wire in several places.

Approval was given for the cars to be withdrawn and they were taken out of service on 17 January 1908. Both cars were then rebuilt to their standard four-wheeled saloon form and operated from Fort Macquarie Depot.

Both cars ended their days as tramway service vehicles. Car 82 was converted to a welding car in 1917 and renumbered 121s in the service stock roster. It was attached to Leichhardt Depot until scrapped in 1926. Car 33 was withdrawn on 11 November 1924 and was used as a haulage car at Randwick Workshops. No. 33 was not renumbered into the service stock roster in numerical sequence, although it became 33s with the addition of the "s" to its passenger number. 33 was retained at Randwick workshops until 1959 when it was withdrawn from service. It was sold for use as a studio-workshop at Mt Victoria, west of Sydney. From there it was purchased privately and taken to Springwood for restoration. Little progress was made and the car ended up at a proposed narrow gauge tourist railway in the Megalong Valley. It became surplus to the railway's needs and was finally acquired by the



then Newcastle Tramway Museum and stored at Maitland.

Although its restoration is in the distant future, this last relic of Sydney's double deck electric tram experiment will one day run on the new line being constructed by the Maitland Tramway Park and Museum at Rutherford.



# TROLLEY WIRE

No 233

MAY 1988

\$5.50\*

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**SYDNEY TRAMWAY MUSEUM OPENED — SPECIAL 68 PAGE ISSUE**

# NEW SYDNEY TRAMWAY MUSEUM OPENS

Saturday, 19 March 1988 dawned with overcast skies after falls of heavy rain during the night. Some light morning showers did not dampen enthusiasm and the gates of the Museum site were kept closed to all but working members as mopping up and last minute preparations were carried out.

Shortly after mid-day the gates were opened to visitors who were entertained by the Transport Institute Band playing rousing music in the Picnic Area. Lads from the 1st Loftus Scouts and Cub Pack manned gates and doorways with great efficiency, thus freeing Museum members for more complicated tasks.

By 2.00pm a crowd of 1200 members, guests and visitors had gathered to witness the official opening of the Museum's Restoration Building and Tramway. Howard Clark,

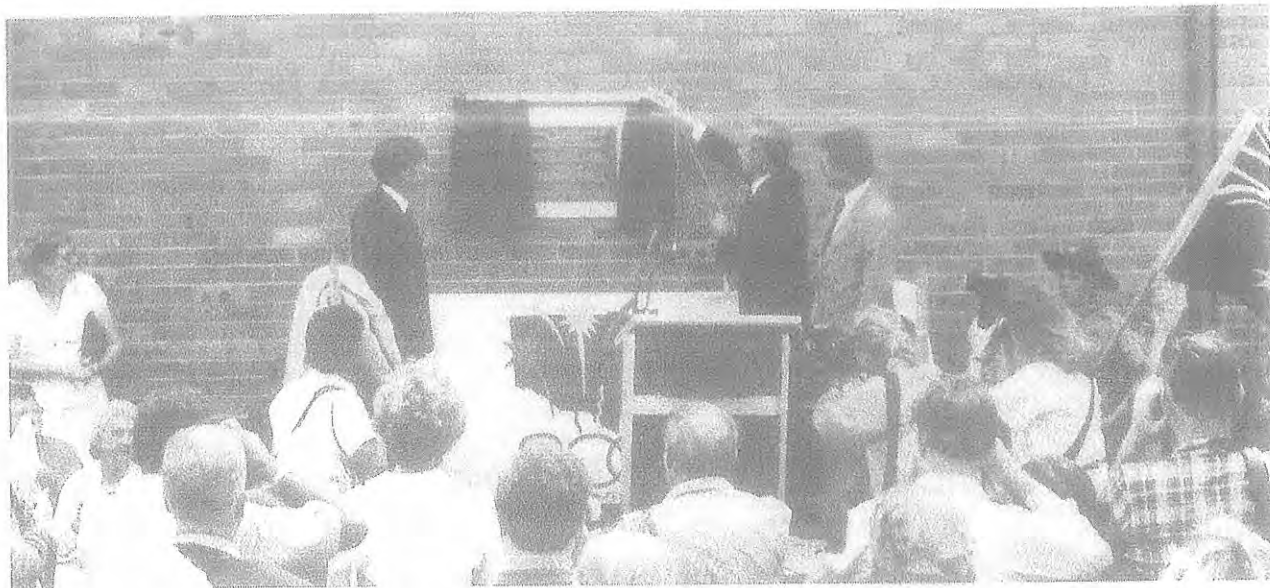
Chairman of the Museum's Bicentennial Opening Committee, welcomed our guests and visitors. He outlined the Museum's history and its progress at the new site. Speakers representing Federal, State and Local Government were then introduced to say a few words. They were Museum member Robert Tickner MHR, Federal Member for Hughes; Mr Maurie Keane MP, State Member for Woronora; and Mr Stan Nurthern, Bicentennial Committee of the Sutherland Shire Council. The speakers stressed the co-operation at all levels of government and the community in having been able to assist the Museum's volunteer work force with its construction programme.

Robert Cowing, Chairman of the Museum's Board of Directors, welcomed the Chairman of the New South Wales Bicentennial Council,



*"Are we ready?" Gerry Gleeson asks Bob Cowing, Museum Chairman of Directors. With them on the front platform of F car 393 are Maurie Keane, MP, State Member for Woronora, and Robert Tickner, MHR, Federal Member for Hughes.*

BOB MERCHANT



*Mr Gerry Gleeson, Chairman of the NSW Bicentennial Council unveils the plaque to mark the completion of the Restoration Building on 19 March 1988.* BOB MERCHANT

Mr Gerry Gleeson to the Museum. Mr Gleeson expressed his pleasure at being asked to perform the official opening and regretted that sufficient funds had not been available to fully complete the building's interior. Mr Gleeson then unveiled a plaque and declared the Restoration Building open.

As guests joined their designated tramcars, Mr Gleeson joined Rob Tickner, Maurie Keane, Howard Clark and Bob Cowing on the front platform of F class car 393. After a suitable delay for photographers to position

themselves, Mr Gleeson cut the ribbon stretched across the track and declared the tramway open. F393, driven by Museum Chairman Bob Cowing moved slowly down Tramway Avenue followed by O class 1111, P car 1497 and R1740. The four trams spread out and picked up speed for the run along the private right-of-way to the north end of the line.

Upon returning to the Museum, guests adjourned to the Restoration Building for afternoon tea and the four trams provided



*The scene in Tramway Avenue prior to the cutting of the ribbon to mark the opening of the tramway. The trams are F393, O111, P1497 and R1740.* PETER HALLEN





*Wayne Armitage takes the 3.30pm run with F393 carrying the mailbox for the philatelic covers produced to mark the Museum's opening.*

PETER HALLEN

rides for our visitors during the rest of the afternoon.

At 3.25pm a mail box was attached to the front apron of F393 to carry the special covers produced to mark the occasion. At 3.30pm the mail tram left with a well-filled mail box and the box was carried by the car on following trips to enable more visitors to post their envelopes on the tram.

At 5.00pm the gates were closed and the crowd gradually dispersed. Trams, however, ran for the benefit of Museum members for some time after that.

Although there was no media coverage of the Museum's opening due to the State Government election being held on the same day (resulting in a change of government for the State of New South Wales), and heavy rain in other parts of Sydney during the day keeping potential visitors at home, the day was judged to have been a success. Many people, including some of our members, expressed surprise that we were able to meet our commitment to open on the due date. That we were able to do so was due entirely to a very dedicated band of working members who expended much time and energy to ensure the deadlines were met. To them we owe our sincerest thanks.



*Refreshments were served inside the Restoration Building. This view looks towards the north-east corner where the toilet, shower and change room will be located.*

MAL McCaULAY



# THE END OF THE BEGINNING

by L. P. Gordon

The notices had been posted in the trams for some weeks; they advised that tram services on the National Park line would be discontinued after 5.00pm on Sunday, 13 March 1988 and that there would not be a replacement omnibus service.

And so it came; at 5.00pm on the appointed day, R11979, driven by Ted Davies, with conductor Bill Tuffnel and carrying a standing load, departed from South terminus and wended its way, with one photo stop, to the northern terminus at Princes Highway. The poles were changed and it returned to depot junction, reversed once more and entered the depot yard where the passengers disembarked. After an oration by Dale Budd, 1979 was slowly driven into the depot, on three road, and the doors closed behind it. A small demonstration to 'save our trams' was to no avail as the depot junction points were clipped and the mainline rail joint broken: the last tram had passed.

The electric tram service at The Royal National Park had commenced twenty-three years before on Saturday, 13 March 1963 when at 2.37pm LP 154 was driven through a ribbon by the then Deputy Premier Pat Hills. K1296 followed with the first public service and this car also inaugurated the regular Sunday services the next day. Regular is the key word, for a scheduled operating day has never been entirely missed, although there were a number of occasions when operations were restricted due to power supply (the supply authority's, not the museum's).

So, the end of the beginning has passed for the pioneer electric tramway museum operation in Australia. Its period of operation has exceeded that of many public tramways and it paved the way for the proliferation of tramway museums that followed.

The beginning was on 24 July 1950 when the then Commissioner for Road Transport and Tramways, Mr AA Shoebridge, made available LP 154 to the Sydney branch of the Australian Electric Traction Association for preservation. But the idea from which the South Pacific Electric Railway and ultimately the Sydney Tramway Museum grew goes back to the afternoon of Saturday, 11 April 1949, on an AETA hiking outing. This excursion consisted of a train ride to Sandown, on the

regular steam operated service, followed by a hike along the Rosehill to Redbank Wharf section of the private steam tramway from the gates of Parramatta Park to Redbank Wharf at the confluence of the Parramatta and Duck Rivers, which had closed on 31 March 1943.

At Redbank Wharf one apron of Sydney Ferries Ltd steam motor 6 and the frames and wheels of their goods trucks numbers 3 and 36 were inspected. On the return hike to Camellia, the junction of the Sandown and Carlingford lines and where the tramway crossed on the level, Norm Chinn and Ken McCarthy, to the disgust of the rest of the party, rolled a set of steam tram trailer wheels along the adjacent railway siding which paralleled the tramway right-of-way for some distance. These relics were then derailed and left at the edge of the road. During this act of

*Sydney Tramway Museum*

*No. 1*

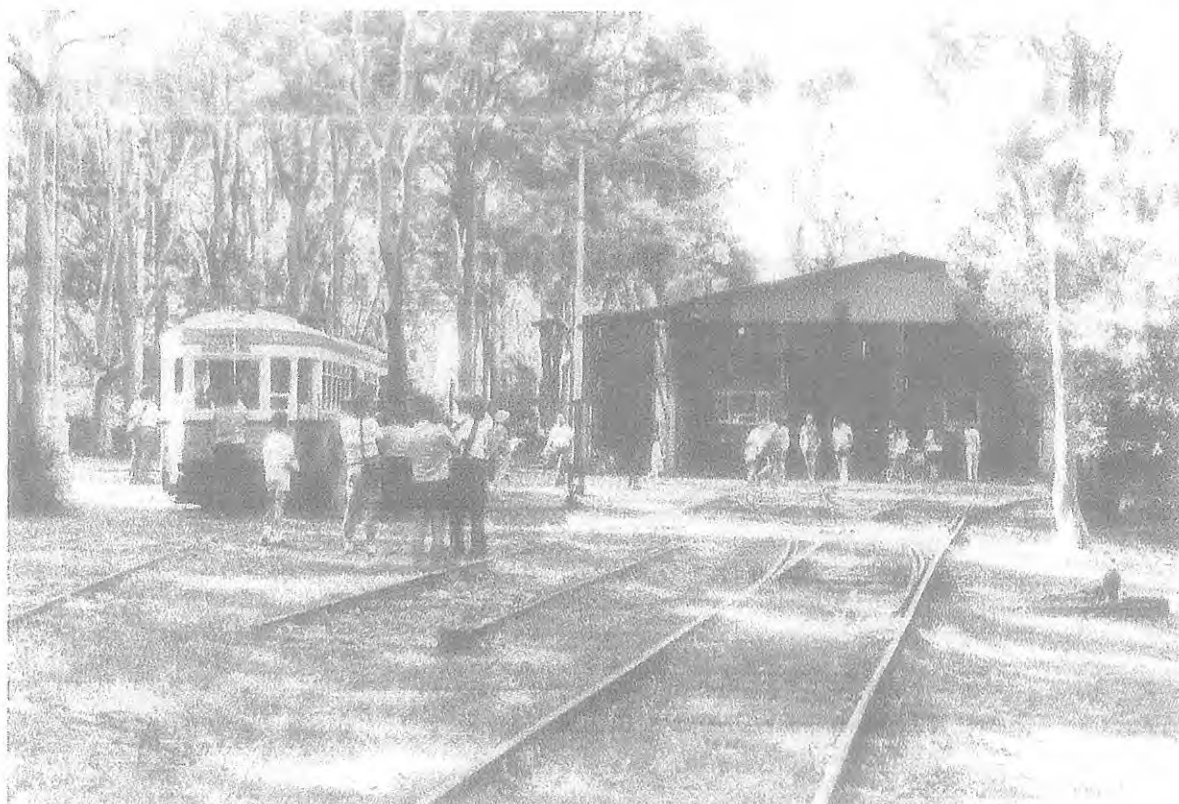
## NATIONAL PARK LINE

### Notice of Closure LOFTUS-SOUTH

**Commencing Sunday, March 13th, 1988**

**Tram services on the  
National Park line  
will be discontinued  
after 5.00pm. on  
Sunday, 13th March, 1988.**

**There will be no  
replacement  
omnibus service.**



*Early afternoon on 13 March. Visitors are starting to arrive as 1979 and 1740 wait on the main line. This view of the depot yard is looking north.*

DICK HALL

physical exertion the two villains discussed the possibility of purchasing the remains of steam tram motor 5A (ex-Government and Sydney Ferries), then standing derelict in the yard of Joseph Edwards at Sydenham, and preserving it in the yard of Mr A Chinn at Mortdale.

During the following week an approach was made to Messrs Joseph Edwards and this firm was willing to dispose of the steam motor for £100 (\$200). There the project was dropped, being beyond the means of a schoolboy and an apprentice.

Eventually Ben Parle and Bob Young joined with Norm Chinn and Ken McCarthy to win over a begrudging majority of the Sydney AETA to request the Transport Department to make available the body of an LP class electric tramcar, then being scrapped, for preservation. Mr Shoebridge not only agreed to make the request possible at no cost to the Association, but he would make a complete car available.

The Association could choose the car it wanted and this was eventually narrowed to three cars, 122, 154, 222. Whilst this choice was being considered, the tramways union placed

a ban on the use of E, K, N and LP class cars on the grounds that they were dangerous for conductors to work on in the increasingly motor-vehicle congested streets because the body sides overhung the footboards. The ban was later lifted on the curved sided E, K and N cars but the LP class remained out of use until the union received guarantees regarding delivery of new R1 class cars.

LP 154 had been returned by road to the main Sydney tramway system on 7 September 1949 after the closure of the isolated Rockdale line, where it had operated since 22 August 1935; it went into store at Newtown Depot. While the ban still existed Newtown Depot found itself short of cars for Randwick Racecourse traffic. For some unexplained reason a coupled set of LP cars was released for this traffic, one car being 154 which during the afternoon sustained some damage in a collision. Following normal procedure the car was forwarded to Randwick Workshops for repair. However all work on LP cars had by this time ceased, but realising that an error had been made the workshop staff decided to cover up by doing a quick patch up and return it to Newtown as soon as possible.

By this time in their life all the remaining LP cars were rather decrepit and the entry of 154 into the workshops did not go unnoticed. Enquiries were made to see if a bit more than a patch up could be done on this car as it would then be a good choice for preservation. The workshop was noncommittal, 'We'll see'. Ultimately 154 remained at Randwick for much longer than expected and unnoticed was sent to Rozelle Depot for storage where, upon inspection, it was discovered that it had been fully repaired and repainted whilst some mechanical and electrical work had also been done. The choice of car had been made.

Once started the collection grew and by the close of 1953, four preserved tramcars and a large amount of equipment was stored at Newtown Depot. During 1952 permission was received to work on the cars on the Commissioner's property. This work ceased, when on 20 November 1954 Tempe Depot closed and the remaining services in the south-western suburbs became operated wholly from Newtown which no longer had space for stored cars. During November there was a major re-allocation of trams between most of the depots on the main Sydney system. Most of the stored cars in Newtown,

including the four museum cars, LP 154, F393, N728 and Prison 948, went to Ultimo, which had become an unstaffed store depot when the Drummoyne service closed on 27 June 1953. Most transfers were made in three-car sets; the museum cars left Newtown for Ultimo on the night of Tuesday, 9 November 1954, each car being towed by a coupled set of O class cars. The Balmain counterweight dummy joined the museum fleet in Ultimo after the closure of the Darling Street Wharf line on 5 November 1955.

By 1955, with further Sydney tramcars expected to be available for preservation, the Sydney branch of the AETA decided that it would be politic to divest itself of the four trams already collected. The tram scrapping policies of the Transport Department were being strongly contested with brochures, theatre slides and press reports and it would have been embarrassing for the AETA to continue this fight on one hand whilst accepting favours from the Department in the form of the equipment and vehicles being handed over for preservation. The inaugural meeting of the new organisation, the Australian Electric Transport Museum, was held on 1 August 1955. Available capital was £12



*Ted Davies (right) and Bill Tufnell pose with 1979 at the southern terminus of the National Park line before making the last run.*

DICK HALL





*R1 class 1979 rolls into the depot for the last time, 13 March 1988.*

MAL McAULAY

(\$24). The collection could not remain on the tramway's premises indefinitely as the gradual, but accelerating, closure of the Sydney tramway system was creating a shortage of depot space. Notice was given that Ultimo Depot would have to be vacated by June 1956. The other stored cars in Ultimo were slowly being towed to Randwick for scrapping: one notable occupant being OP1089 which was stripped and the body sold. In the event, June 1956 came and went but the museum fleet remained in Ultimo. As the AETM was actively seeking a site Commissioner Shoebridge made space available in Rozelle Depot on a short-term basis and the cars were towed there by O1468 on 15 October 1956 to be joined by C290/115s, K1296, E529-530 and Freight Car 24s.

During late 1955 and the first half of 1956 nine possible sites for a museum tramway were investigated, two being considered as temporary; these covered an area from Picton and Helensburgh to the south of Sydney to Lambton in the north and were mainly old tramway and railway formations, including tunnels. The National Park site was really

chosen by default, but at the time it offered potential for future development. On Sunday, 26 August 1956, survey pegs were put in at National Park for the earthworks for the tram depot. This site was parallel to the National Park railway and covered the area now partly covered by the substation. During the week it was discovered that a water main passed under the area and so the following weekend work started again, this time on the site of the first stage of the present depot.

When work commenced total membership was 25, with a nominal active membership of 16. The building was 120ft x 40ft with four pairs of double doors at the south end. Only three of the four proposed tracks were initially laid, using 60lb rail in extremely poor condition which had been recovered, by members over the 1956-7 Christmas/New Year period, from the La Perouse end of the long abandoned Matraville-Yarra Bay tramway. Pole type construction was used for the depot, the poles being obtained from Victoria Road Gladesville where they formerly supported the overhead of the Ryde tramline. Very second-hand corrugated iron sheets from the roofs of



the City Markets provided rudimentary walls; there was no roof at this time.

Original plans called for a second depot building adjacent to the Royal National Park railway station. However, owing to complex circumstances, due in some part to political considerations, which continually plagued the society, this plan could not be carried out and extensions were added to the original building which during 1959 to early 1961 was roofed using timber and corrugated iron obtained by dismantling a wartime charcoal storage shed at Wolli Creek perway yards. A 30ft extension was added to the northern end of roads 2, 3 and 4 in early 1961. Subsequently in 1965 and 1966 further extensions were made on the western side of the building. The final outcome of this was an irregular shaped building 152ft long by a maximum width of 66ft with 4, 6 or 5 tracks, two of which are entered from the northern end. While all this was being undertaken the entire structure of the original building was replaced, steel columns were used in place of wooden poles as it was necessary to raise the roof height to provide sufficient clearance for the overhead wire. Some wooden poles remain in the newer sections of the building. The skillion roof has in part been replaced by a pitched roof of pleasing lines with a gable over the main doors. With the necessity to move becoming more inevitable a higher skillion was used on the remainder of the building. Altogether six separate extensions were made.

Whilst all this activity was going on time was still found to take steps to save some Adelaide trams for preservation. The Municipal Tramways Trust offered A1, E1 111, D192, F1 264, H380 and H1 381 in October 1956, with the daunting prospect of bring this fleet to Sydney. The formation of a branch of the AETM in Adelaide was covered in *Trolley Wire* for August 1987.

With only the barest of facilities available the first trams arrived by road from Randwick Workshops in March 1957. The four-wheel cars came in one piece, but the bogie cars had to be lifted off their bogies. The cars arrived on the dates shown and were placed on the tracks listed in order from the south end.

Monday, 18 March 1957 — Road 2  
F393, 948, N728

Tuesday, 19 March 1957 — Road 3  
Dummy LP 154, K1296, C290

Wednesday, 20 March 1957 — Road 4  
24s, E529, E530

The cars were unloaded at the north (back) end of the depot onto temporary track which



*The Museum's first General Manager, Norm Chinn, hammers in the first peg on the National Park site on Sunday morning, 26 August, 1956. Later the depot site was moved a few yards further from the railway line.*

HUGH BALLMENT

was moved overnight. The next arrivals were O1111 and 99u on Monday, 18 January 1959. These were placed on road 1 which had been hurriedly laid for their reception. Temporary track was this time laid out the front of the depot.

With the growth of the Sydney activities of the AETM some form of incorporation was needed whereby the liability of the members could be limited and the ownership of the exhibits safeguarded. Various methods by which this could be achieved were investigated and the most convenient and least expensive proved to be registration as a Co-operative Society. Therefore, on 2 April 1959 the South Pacific Electric Railway Co-operative Society Limited (SPER) replaced the AETM (NSW). The Adelaide group was therefore separated from the new society and subsequently followed into local incorporation in 1960.

Pointwork was obtained from Randwick Racecourse early in 1960 but this was subsequently stolen before being laid. Re-

placement pointwork was in the form of a single slip and two turnouts from the Moncur Street siding in the Oxford Street reservation near Waverley Depot. This had been laid in time for the arrival of the next batch of trams, P1497, R1740, D134s and weedburner 144s, on Monday 14 August 1961.

Whilst tramcars have been, and always will be the focus of attention at the museum, it has always been the intention to establish a comprehensive tramway museum and not just be a tramcar preservation society. To this end many tramway artifacts have been collected from the early 1950s. Two major items arrived during 1961. The first, on 2 March was the signal box from the corner of Elizabeth and Liverpool Streets Sydney, outside the entrance to Museum underground railway station. These elevated boxes were a major feature of the Sydney system. The other item, although from the Kogarah trolley bus system, is representative of equipment that was vital to the very existence of electric traction of any type from the turn of the century to the early

1930s. It is a small (relative to others, not in actual size) rotary convertor, which together with transformers and switchgear, arrived from the Grey Street substation on 14 August. Although initially obtained to use as well as display, it has not been used, due initially to cost but, later, being displaced by new technology. Upon arrival the rotary convertor was stored in the back of the depot building but was installed in its own purpose-built brick building in December 1962. It nevertheless remains as one of the museum's most valuable exhibits. The signal box was re-erected during May 1964.

The museum was officially opened as a static exhibition by the then Commissioner of Government Transport, Mr AA Shoebridge on Saturday 23 December 1961 to coincide with the centenary of the opening of the Pitt Street horse tramway. Prior to this, overhead had been erected over the depot fan, but as the poles used had been cut off at ground level when recovered, the wire was only 14ft 6in high.

The need for rails and sleepers led to four years of near continuous work in removing and transporting these items to Loftus, first laying the main line south and then its northern extension.

Sleepers were obtained from the army lines at Moorebank in May 1962. The campaign then turned to the main yard at Randwick Workshops in August and September 1962. Despite the quantity of track and pointwork available only a small amount of rail and a few turnouts proved to be re-usable. Most of the trackwork turned out to be very secondhand from elsewhere on the system, even to the extent that extremely worn grooved rail was relaid with the groove outwards and not used. Randwick was revisited from February to May 1964 when rail was lifted from the repair shop. Despite these major undertakings, the big job was yet to come. Between November 1965 and July 1966 the one mile single track, with runaround loop, railway line between Regents Park and the Water Board pumping station at Potts Hill was lifted, stacked at the pumping station and then transported to National Park. This was followed by the recovery of some grooved rail from the Ascot Racecourse line, at that time within the boundaries of Mascot Airport, and pointwork, including a scissors crossover, from Rozelle Depot.

The mainline headed south towards Temptation Creek, at this point only a small watercourse, but only reached approximately



*The poles used to construct the first National Park depot were tramway overhead poles which were removed from Victoria Road, Gladesville on the Ryde line.*

HUGH BALLMENT

1000 feet from the depot by September 1963 which remained as the souther terminus. A left hand turnout, facing trams returning to the depot, was installed just south of the depot yard and the mainline extended northward on the western side of the depot, eventually reaching the Princes Highway on 10 December 1966. The junction was later realigned to a Y turnout.

Whilst all this was going on, time was found to obtain centre aisle (dreadnought) car 180 from Brisbane and this arrived in Sydney on 16 August 1962 and was stored at Randwick Workshops alongside O breakdown car 141s (1030) which had been purchased by a member, on land now owned by the University of New South Wales.

A four-wheel Cadillac railmotor arrived from the Richmond Vale railway, near Newcastle, on 26 October 1963 and was made operational on Saturday, 2 November 1963. Regular service with this vehicle commenced on Wednesday, 1 January 1964.

Work was progressing on providing 600V DC power. As the rotary convertor required an 11000V supply, which was financially beyond the reach of the society, alternatives were sought. These eventually culminated in the

construction of a motor generator set which operated from the 240V supply. This was supplemented by a second set which had supplied the swing span of the old Gladesville Bridge across the Parramatta River after the tramway supply ceased. Still later a third set was constructed. The Gladesville set is now with the AETM at St. Kilda. The remaining two sets were on standby at the closure having been supplanted some years before by a silicon diode rectifier. First power from the original MG set was supplied by a temporary connection on Saturday, 27 June 1964 when, during an ARE visit, D134s was positioned in front of the depot with lights and compressor working. The first tramcar movement under power took place at 4.27pm on Sunday, 19 July 1964 when LP 154 was driven in the depot yard on a wandering lead, the overhead having been pulled down prior to re-erection at a proper working height.

The first part of the permanent overhead wire was used on 6 September 1964; the wire reached South terminus on Sunday, 25 October 1964. LP 154, with a scaffold on the roof, was used, coasting down to the terminus. The big test came when the power was switched on and the car was successfully



*Rails for the first depot were salvaged from the closed Matraville line near Yarra Junction in January 1957.*

HUGH BALLMENT





*Crosscut saws and axes were the tools of trade for the first months as trees and undergrowth were cleared for the erection of the first depot.*

HUGH BALLMENT

Started on the 1:27 grade and driven back to the depot. Meanwhile the Cadillac continued to run as electric cars were restored and put into operable condition. However, at 4.12pm on Sunday, 3 January 1965 the Cadillac failed at South terminus with a blocked fuel filter and D134s was sent to rescue the passengers and tow the railmotor back to the depot.

The two cars stored at Randwick, Brisbane 180 and O1030, arrived at National Park on 3 August 1964 and although the first extension had been made to the depot they could not be accommodated and were stored in the substation yard for two years.

Storage space as constantly being sought to house all the fleet under cover and during 1964 negotiations took place with the Railways Department for the lease of Picton loco depot shed. These had progressed favourably until an inspection of the building by railway engineers, when it was declared unsafe.

As outlined previously the tramway was officially opened on Saturday, 13 March 1965 by the Hon PD Hills, MLA, Deputy Premier of NSW. LP154 was the official car, followed by K1296. Prior to the opening the following cars were operational from the dates shown:

LP154 — 19 July 1964  
 D134s — 16 August 1964  
 R1740 — 26 September 1964  
 O1111 — 27 September 1964  
 C290 — 18 October 1964  
 K1296 — 6 December 1964  
 P1497 — 13 December 1964  
 99u — Prior to 20 December 1964

It will thus be seen that at this date eight of the sixteen trams at National Park were operational.

A period of consolidation took place as the museum members began the task of learning to operate a 'living' museum. Plans were being drawn up at this stage for the implementation at an early date of the first portion of track extensions which would eventually see the tramway extend to a picnic ground some distance beyond the Royal National Park railway station.

These plans were never to reach fruition. On 21 July 1967, one week after work had commenced on the right-of-way extension, the Park Trust called a halt. No extension of the line would be allowed at this time. A change



in the administration of The Royal National Park from an individual trust to direct supervision by the New South Wales National Parks and Wildlife Service on 1 October 1967 did not allow for developments such as the tramway museum in the park and an eviction order was issued.

The NP&WS viewed the society's plight with some sympathy and even approved minor works needed to maintain safety and security. Rebuilding of the depot continued to a modified design and much of the track was relaid and upgraded. The original reason given for the removal was that an expressway was proposed to run across the museum's corner of the park, but political manoeuvres saw this shelved. For this reason, the society was able to receive a stay of proceedings, but it was clear, the tram museum had to go.

Once more the society was forced into the task of seeking a new site.

The fleet continued to grow; other arrivals at National Park have been:

PR1 1573 — 18 December 1965  
C29 — 16 July 1966  
93u — 12 July 1967  
Brisbane 71 — 26 June 1968  
Brisbane 295 — 3 October 1968  
Grinder — 15 September 1971  
Ballarat 12 — 16 September 1974  
Ballarat 37 — 14 October 1974  
Ballarat 548 — 14 October 1974  
R11979 — 14 October 1974  
Cable Trailer 23 — 3 July 1976  
O957 — 17 March 1978  
R11971 — 9 March 1979  
OP1089 — 31 May 1979  
W2392 — 24 March 1984

Three other cars have gone direct to the new Loftus depot; 42u on 29 July 1981, R12044 on 9 July 1983 and San Francisco PCC1014 on 8 June 1987. Not including the counterweight dummy, the weedburner (144s) and the grinder, which can be classified as rail-mounted machinery, the tramcar fleet after 38 years thus stands at 33. The foregoing listing, however, simplifies the activity involved. PR1 1573, OP1089 and R12044 are bodies only and are temporarily, respectively mounted on Melbourne W2, ballast motor and Melbourne W4 bogies. 93u as obtained had been cut down to a flatcar trailer; 43u has railway contour wheels. The Sydney cars came from backyards and farms as well as Randwick and Eveleigh workshops. 548 arrived in Sydney on 9 June 1969 and was stored in the railway yard at Petersham until it was moved to the loco roundhouse at Enfield on 25 August 1971 where it was joined by Ballarat 37 on 29

September 1971 and R11979 on 17 August 1972. OP1089 was stored at Ingleburn from 1 February 1974. The fleet, however, has never been intact at National Park as C29 left on lease on 24 August 1972 and has yet to return, cable trailer 23 went to Warrawong High School for restoration on 31 December 1983 and by the time W2392 arrived eight cars had been moved to the new Loftus Depot and, of course, three cars went directly there. The maximum number of cars at National Park at any one time has been 28 with a total of 30 having been there.

One other tram has operated at National Park; this is replica Melbourne grip car 593 which was tried on the line upon its arrival from Swan Hill on 10 March 1986. It later operated on 25 May 1986 with cable trailer 23 which returned after rebuilding. Neither of these vehicles were housed at National Park, being moved to the Loftus Depot after each day. The grip car operated on the available trackage at Loftos on several occasions before returning to Victoria in January 1987.

The commencement of passenger operations and the search for a new site did not decrease the level of other activities, which however, were undertaken on the basis of a short-term requirement only. Besides the depot rebuilding work, as previously outlined, the track was relaid and partly reballasted south of depot junction during 1971 and 1972 and some re-alignment made on the northern end. Overhead was also regularly serviced and repaired. The last major work undertaken was the connection of the two tracks which entered the depot from the northern end; these had remained unconnected to each other or the main line. They were connected together by a three-way frogless stub point with a headshunt across Lady Rawson Avenue in time for the arrival of Ballarat 12 and the mainline junction was fully usable by 30 November 1974. This line is known as the east branch, is only partly wired and has seen passenger traffic only on a few special occasions, mainly being used to store rolling stock.

Other items to arrive during this period was the waiting shed from Miranda, on the Sutherland to Cronulla steam tramway; a wheel lathe, wheel press and gas ring from Randwick Workshops and the large, signal-box-surmounted, waiting shed which had stood sentinel in Railway Square for about 70 years. It was made available by the Sydney City Council and was dismantled in June 1973. The Miranda waiting shed was slightly shortened, due to termite damage, and re-erected on the departure platform where it stood for many years until it became necessary



*The first tracks are laid in the depot in preparation for the arrival of the first trams. The depot, an open air compound when built, was roofed in late 1959.*

HUGH BALLMENT

to remove it due to continual vandalism. The machinery and Railway Square waiting shed were stored, awaiting a new site.

Further work at National Park was then limited to tramcar overhaul and maintenance, and essential track and overhead maintenance.

More rail and pointwork was obtained, although obviously not for use at National Park. In 1974 rail and points were obtained from the Australian Government; in 1975 the former Sydney Meat Preserving railway branchline at Auburn was lifted using RED scheme labour. Tramway pointwork was recovered from Chalmers Street, as part of the reconstruction of this thoroughfare after construction of the Eastern Suburbs railway underneath, in 1978, and Rozelle Depot was revisited in December 1982. Some heavy rail was also obtained from Tallawarra power station.

Overhead wire and troughing were removed from Ultimo Depot in February 1980. For many years the society had been slowly collecting steel light and overhead poles and cast iron bases.

Road vehicles have not been ignored by the society. Very early in the formative stages of the collection application was made for a low bridge double deck bus and a wartime austerity bus; unfortunately tenders had been called for the purchase of the remaining vehicles of these types (some austerity buses were used as mobile perway gang sheds, being towed as required as the engines and transmissions had been removed). Some years later a road vehicle collection was started and now comprises:

- 19 AEC double deck 3-axle trolley bus
- 1275 Leyland Tiger TS7 single deck half-cab bus
- 1615 Albion double deck half-cab bus
- 1619 Albion double deck half-cab bus
- 1694 AEC Regent double deck half-cab bus
- 2619 AEC Regent 3 double deck half-cab bus
- 3434 Leyland Worldmaster ERT1/1 under-floor bus
- AEC Matador bus recovery vehicle (ex Howitzer tractor)

Bedford tower wagon ex Sydney,  
ex Melbourne

Bedford tower wagon, ex Sydney,  
ex railway

Ford Thames fire engine

Sprague battery electric crane

A Dennis fire engine was obtained in 1977 but this was returned to the Board of Fire Commissioners in 1982 in exchange for the Ford Thames, for display in the Museum of Fire. The society has had and still has other road vehicles for support use which were not part of the collection; notable among these were two blitz trucks, which were ultimately sold to military vehicle collectors.

The society's buses are well known around Sydney and Wollongong, taking part in rallies, displays and special services. However, not all the trams have been restricted entirely to the depots and other storage areas. The following list shows the wanderings:

N728 to Ryde for display 6 November to 10 November 1971.

C29 to The Rocks on lease to The Old Spaghetti Factory Restaurant, yet to return.

D134s to Eastern Suburbs Railway for track cleaning, 13 September to 30 December 1978 and 24 March to 15 June 1979. To Cronulla railway line for track cleaning, 15 July 1983, from Loftus depot.

O1111 to Manly for display, 16 January to 19 January 1981. To Sydney Showground for display, 28 March to 18 April 1982, returned to Loftus depot.

K1296 to North Sydney for display, 19 March to 22 March 1982, returned to Loftus depot.

K23 to Warrawong and Albion Park for rebuilding, 31 December 1983 to 24 May 1986, returned to Loftus depot.

P1497 to Waverley Depot for display, 12 July to 15 July 1985.

R11979 to Sydney Showground for display, 22 March to 8 April 1988, returned to Loftus depot.

Other movements have involved the return of the Cadillac to the Richmond Vale railway. It had spent some years stored at Enfield and the Enfield roundhouse; it returned to National Park and was stored in a small yard behind a gate with a sign that proclaimed 'Fire Truck Keep Clear' much to the mystification of visitors. The Balmain counterweight dummy was sent to the Hunter Valley Training Company, at the State Dockyard, Carrington in late 1986, staying briefly at Loftus depot on the way. It was moved to the old South Maitland railways workshop at East

Great Junction, Maitland early in 1987 where it shared a track with an SMR10 class tank locomotive whilst undergoing rebuilding. The dummy returned to Loftus in time for the opening, being replaced at Maitland by the weedburner, which also briefly stayed at Loftus on the way.

Although fully occupied with the practical aspects of building and operating a museum tramway, society members nevertheless found time for other activities, notably tours. The first tram tour was held on 11 August 1956 using K1296 to Watsons Bay. From this small beginning evolved an extensive program of tram, bus and train tours in New South Wales, Queensland and Victoria with one bus tour in Canberra. One notable excursion was over the Byron Bay tramline on 4 November 1961 which covered the private branch line between the railway station and the jetty in former Sydney C class car 37 drawn by a Simplex four-wheel petrol loco. Another tour, notable for its repercussions, was a combined railmotor and steam trip from Sutherland to Summit Tank on 25 July 1962. During this trip the forthcoming closure of the Camden tramway (actually a railway branch line) was discussed with the idea of possibly keeping it running. From this initial proposal the idea of an overall railway museum was formulated. Further discussions later took place at National Park and the feasibility of SPER expanding into the railway sphere was considered but ultimately rejected and instead the NSW Rail Transport Museum was formed.

The society has, however, made one small incursion into the railway preservation field. The first train tour was to Newcastle in CHP railmotor no. 1 on 2 November 1959. With the mass withdrawal of these vintage vehicles late in 1984 the society purchased no. 1 which is now in the care of The Railmotor Society at Paterson, near Maitland.

However, all good things come to an end. Work started on the new site, across the Pacific Highway next to Loftus railway station in April 1980 and the reality of moving was made obvious to everyone. The friendly little site, slowly being reclaimed by the bush, would soon be replaced by a larger, a massive, business-like enterprise across the road. The new museum site would be crowded and certainly not as pleasant or as picturesque as the existing setting, but it would portray the trams in more familiar surroundings.

By the end of 1982 the first stage building was advanced enough to transfer some cars across: it already held 42u, K1296 and O1111.



A loading ramp was constructed at the northern terminus and on Saturday 20 November 1982 six cars, C290, Ballarat 12, D134s, E529, E530 and freight car 24s were moved by low loader using roll-on, roll-off methods, or more precisely, drive-on, tow-off. R12044 arrived direct to Loftus on 9 July 1983.

The twenty-fifth anniversary of the closing of the Sydney tramway system was to be commemorated on Saturday 22 February 1986. To this end an effort was made to make the Loftus site operational. The depot fan had been completed and the access track along the western boundary reached south to the depot junction. The substation equipment, which had been obtained from Murray Street at Darling Harbour, was installed in a temporary building (an LCL container) during the morning of Saturday 8 February 1986 and at 5.12pm on that day K1296 made the first journey under power from a wandering lead. Overhead was erected the next Saturday, 15 February and all was ready for the twenty-second.

The commemoration was to be the last major event at National Park, but it was to share the day with Loftus. The focal point of the day was the parade of Sydney tramcars at

about 2.30pm with LP154, N728, P1497, R1740 and R1979 taking part. The interstate cars were relegated to the depot for the day. Following the parade, invited guests were taken by bus to Loftus where 1296 operated for them and later the public — two museums in operation at the same time, although it was to be two more years before Loftus was complete enough to open for regular operation.

The next move was on Saturday 7 March 1987 when ballast motor 99u, P1497, F303 and prison car 948 were loaded by crane and taken on the short journey along the highway. PCC1014 arrived direct on 8 June 1987.

On Thursday 17 March 1988, after the closure at National Park, LP154 and R1740 were loaded from the ramp and moved across in readiness for the opening at Loftus on Saturday 19 March 1988, although 154 was for display only, having failed some weeks before. The opportunity of running the last car at National Park, R1979, on the first day at Loftus was passed up and instead it went to the Showground on Tuesday 22 March 1988, returning to Loftus on Friday 8 April 1988.

The National Park site has to be vacated by the end of March 1989; thirteen trams, the grinder, rotary convertor, spare parts and



*Another view of the Museum's National Park site. Some of the 400 yards of track and one set of points obtained from Yarra Bay can be seen in the foreground. This photo is looking south from near the future substation site.*

HUGH BALLMENT



much other equipment have to be moved, the depot and substation buildings pulled down and the track and overhead dismantled. This work will of necessity take a lot of resources away from the Loftus Museum.

Despite the effort and money that has been put into the Loftus Museum development it cannot at present house all the vehicles in the collection. With the return of 1979 the disposition of the collection is:

*Paterson*

CPH 1

*Maitland*

Weedburner (141s)

*The Rocks*

29

*Chullora*

Trolleybus 19

*Loftus*

12, 23, 24s, 42u, 99u, 134s, 154, 290, 393, 529, 530, 948, 1014, 1111, 1296, 1497, 1740, 1979, 2044, Dummy, AEC Matador, Bedford Tower Wagons (2), Leyland 1275

*National Park*

37, 71, 93u, 180, 295, 392, 548, 728, 957, 1030, 1089, 1573, 1971, Grinder, AEC 2619, Albion 1619, Ford Thames fire engine

*Warrawong*

Sprague Crane

*Albion Park*

AEC 1694, Albion 1615, Leyland 3434.



*The operation of D scrubber 134s on the Eastern Suburbs Railway in 1978 was a financial lifesaver for the Museum as told on page 20.*

BOB MERCHANT

## **COTMA CONFERENCE — SYDNEY**

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from your Museum Secretary now!*

## THE SEARCH FOR A SITE

Initial prospects for a new site were no more promising than those in 1955-6. The most attractive seemed to be an extensive development south of Campbelltown under the overall supervision of the Macarthur Development Authority in association with the Campbelltown City Council. Protracted negotiations eventually disclosed that the terms under which the Society would join the consortium of museums, developers and others would not be entirely satisfactory and considering the not really favourable topography of the site plus the cost of moving from the Loftus area, the project was ultimately abandoned by the Society.

Government action to remove the NSW Rail Transport Museum from its occupancy of the old Enfield locomotive depot saw plans drawn up for a major transport museum south of Picton on the Picton-Mittagong loop line. The RTM eventually went to Thirlmere as part of this plan, but the trams stayed at National Park. It should be remembered that the idea of a combined tramway/railway museum was considered in 1962 but rejected.

The situation regarding a new site seemed to be resolved in 1970 when an area east of the Sutherland bypass, almost opposite Loftus railway station was offered to the Society for consideration. Examination later proved that it would not be suitable mainly due to poor visitor access. Sited between the existing road and a proposed expressway, the museum would have been highly visible to passers-by but virtually inaccessible. The physical limitations would detract from the proposed tramway operations. The Society declined the offer.

In a move which ultimately proved successful, Laurie Gordon and Norm Chinn went to see the then Sutherland Shire Town Planner, Mr Nichols, on 17 February 1971. The proposal was for a line from the vicinity of the railway substation at Sutherland to the Princes Highway/National Park railway level crossing as stage one. This utilised unused road reservations which followed the eastern railway boundary, whereas the highway as built took a straight line from Sutherland to almost the level crossing. The depot/museum complex was proposed for the triangular site

adjacent to Loftus station. At this time there was still a level crossing in Pitt Street at Loftus station.

A second stage of this proposal would be after the proposed closure of the National Park railway line, which would be occasioned by the building of the freeway. It was a continuation of the line generally along the railway boundary to the Engadine overbridge and would be on National Park land.

The proposal received the support of the Town Planner and really marked the beginning of the co-operation of and help by Sutherland Shire Council, without which which the new museum would not have progressed. It was subsequently found that the road reservation had been extinguished (although still shown on maps) and that the recent subdivision of the land between the railway and highway included the former reservation. The triangular site at Loftus station was, however, unclaimed.

Negotiations for a right-of-way towards Sutherland were protracted; the more promising being with the railways but the new substation to be built at Sutherland blocked any suitable terminal. The depot site was available but was contingent upon the right-of-way being obtained. Fortunately, our sympathetic politician, the Hon. Milton Morris MLA, was transferred from the Transport Ministry to the position of Minister of Lands. In what was fast becoming an eleventh hour position with the museum, Mr Morris arranged for the creation of a special reserve for the express purpose of building a new tramway museum. Sutherland Council agreed to an easement, for tramway purposes, along the western side of the Princes Highway to the substation. Being a designated highway a wide right-of-way had been reserved but the two lane carriage way was built on the eastern side, hence the available strip on the western side.

Whilst all the negotiations were being undertaken the Department of Main Roads widened the highway from the bypass south and in the process took an awkward curved strip of land from the eastern boundary of the depot site which severely restricted the desired layout of buildings and track. Examination of

the site led to the planning of an eight road combined display hall/running shed, restoration building, secondary building, terminal area with the Railway Square waiting shed, picnic area, tramway street and part double track, part single track tramway almost to Sutherland.

Stage one of the building works was commenced on 8 April 1980, nine years after the first approach for the site was made, when four bays of the eventual nine bay building were pegged out. That the Society had little or no money was forgotten, after all, a start was made in 1955 with only \$24. The search for a site was over and the only way to go was forward.

The financial situation was relieved in a rather special way. The railways were working towards completion of the Eastern Suburbs railway as far as Bondi Junction and found that signal tests would not be authorised until the track was scrubbed of mill scale and rust. Plans to run diesel hauled trains over the tracks to perform this task, as would normally be the case, were not possible for a number of reasons. After casting around for a solution the railways eventually hired D scrubber car 134s from the Society.

The result was that 134s, by then almost 80 years old, went to Randwick Workshops to be restored for operation and then to the Eastern Suburbs Railway where it spent three months ambling back and forth scrubbing the rails, being powered by a motor alternator/rectifier set towed on a four-wheel flat car. It returned for a short time just prior to the opening of the line. The revenue from the hiring of the tram enabled the Society to present the State Government Museums Grant Committee with a substantial figure to which the Committee had agreed to make a one-off grant on a subsidised ratio basis. Thus the money was available to commence construction of the new museum.

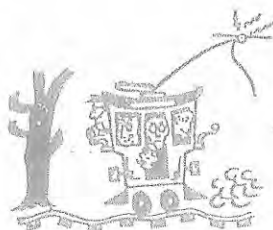
The first steel work was erected on 4 June 1980. As well as the building, work started on

the points and track. The three-way points were installed to link the three running roads and then the track gang began to head towards the south end of the site with the depot main line. Work, too, was undertaken on main line in Tramway Avenue and eventually the day arrived to begin the task of sorting and joining up the various sections of that track layout used extensively in Sydney, a scissors crossover.

Four major financial assistance packages were then granted to the Society. The first of these was a Commonwealth Employment Grant for the building of the main line towards Sutherland. This was augmented by the Sutherland Shire Council who obtained a similar grant for the earthworks and major road reconstruction to Pitt Street along the museum's northern boundary. The Council also contributed from its Bicentennial funds to enable cosmetic work to be undertaken on the exhibits and to the general area of the display hall which would be open to the public. The Society sought and was approved a State Government Bicentennial Grant for completion work on the museum but this eventually only covered part of the cost of erecting the restoration building.

As 1988 drew near and the date of the official opening date was announced, the tempo of work was stepped up. The new museum was to open on 19 March 1988, ready or not. That this was accomplished with literally minutes to spare is detailed elsewhere in this magazine, when restored F393 led a convoy of Sydney cars, O1111, P1498 and R1740 out of the museum gates and along the new line to Sutherland.

The second stage of the original 1971 proposal has been forgotten as with the abandonment of the freeway, the National Park railway has not been closed. However, the boundary of the new museum site extends to this railway line, far past the present southern end of track and the boundary fence.





## SIX WEEKS TO OPENING

A worker's view of the day to day events leading up to the opening of the Sydney Tramway Museum on 19 March 1988.

A number of our members worked during the week to prepare for our big day. They had arranged to clear their annual leave or long service leave, whilst others came down on their days off and even after work. There were a lot of jobs to be done and at times it seemed we would never make it. Here then is a day by day account of that progress.

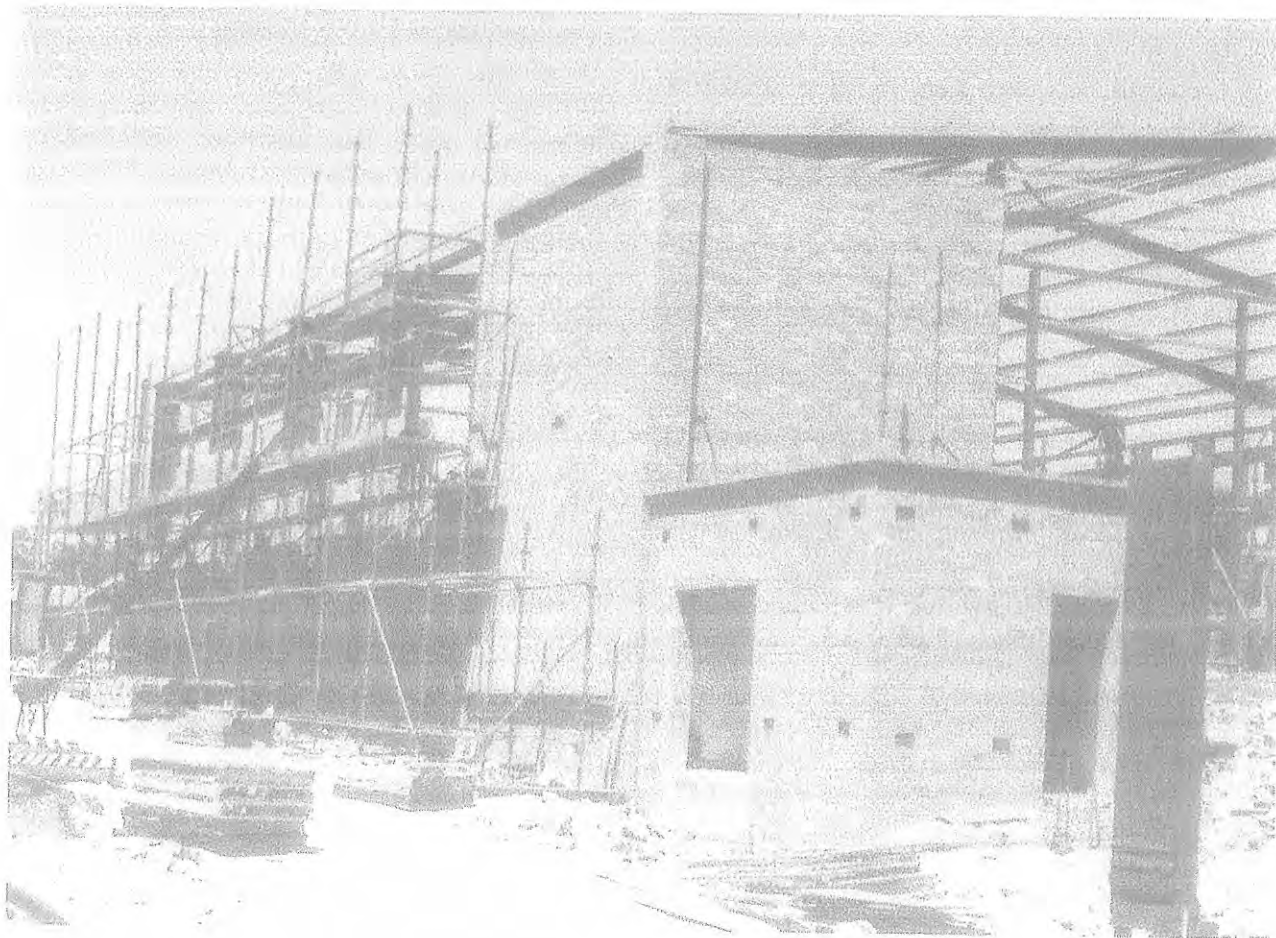
**4 February.** Fifteen cubic metres of concrete went into the scissors crossover today and this lengthy job was nearing completion at last.

**5 February.** The interior walls and ceiling of the substation received a coat of paint today. Lighting within the display area of the depot building was also being erected.

**6 February.** Alex Canini's rockbreaker was hard at work excavating rock for the temporary siting of our kiosk and toilets. The

footings for the signal box from Liverpool Street were also dug out of the rock. The overhead crew erected eight bracket arms along the main line under difficult conditions. The tower wagon had to be run up over the rails and sleepers to get into a suitable position for the poles to be drilled. Others were working in the display area setting out photos and small exhibits.

**10 February.** A paling fence was erected between Tramway Avenue and the future traverser area in front of the Restoration Building. It was given a coat of paint to unify the mixture of recycled palings and it turned out well! Wiring was being carried out in the substation but the rest of us were too busy to ask our electrical boys just what had been done. Inside the depot a galvanised steel wall was commenced which will divide the



*The Restoration Building under construction on 31 January 1988.*

BOB MERCHANT



operating depot from the display area where the public will be. This is a Department of Industrial Relations requirement.

**11 February.** Ten poles were erected and concreted in. They were in rock, of course. The subsoil here is all rock, large, small and in great slabs.

**12 February.** Ballast Motor 99U tested the main line as far as Pitt Street today. Maurie Keane, State Member for Woronora, and Stan Nurthen, Deputy Chairman of the Sutherland Bicentennial Committee, were there to witness the test and were pleased with our efforts. 99U had to be towed back as there was no overhead wiring over Tramway Avenue.

**13 February.** Poles were trucked up to the northern terminus and the bogie from F car 393, which had been overhauled off-site, was collected and the motor refitted.

**15 February.** More concreting was carried out today. The base of the signal box, the stepway of the south door of the restoration building and some gutter work around the entrance to the picnic area were put in. Actually lots of small jobs were being done every day but it was difficult to keep tabs on them all. We're too busy even to stop and record the work being carried out on film.

**16 February.** Work on the internal dividing wall in the depot continued today. It's a job that gets worked on whenever someone was spare. Spare? Who's spare? Bob made sure



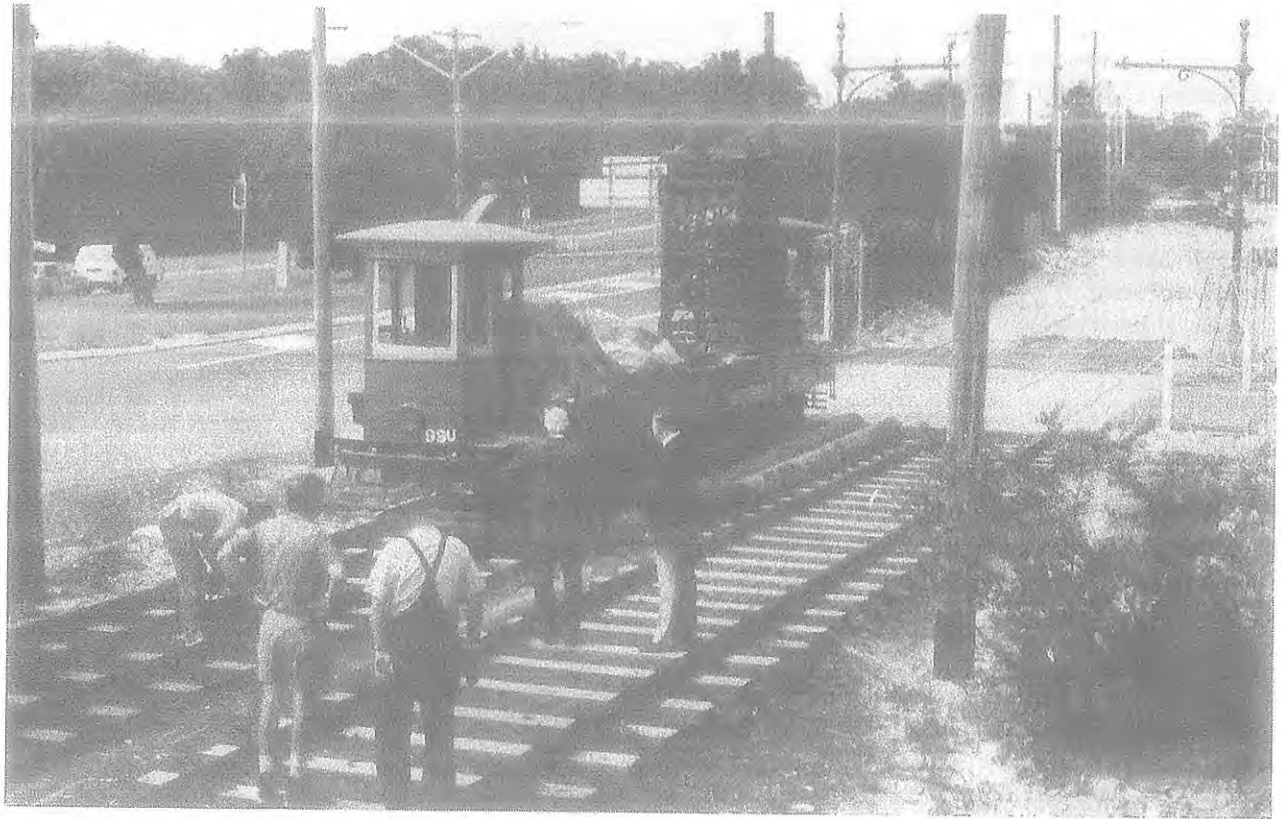
*The roof being lowered onto the signal box on 18 February.*

NORM CHINN



*Wiring is being carried out in the substation and drainage work is being completed along Tramway Avenue.*

NORM CHINN



*99U across Pitt Street for the first time, 12 February 1988. Maurie Keane and Stan Northern called in to witness the event.*

PETER HALLEN

that everybody had something to do at all times! No wonder that job was taking so long to complete!

**17 February.** The northern terminus area was under scrutiny today. The location of Water Board mains and State Rail's 1500 volt feeder for the Cronulla line had to be pinpointed as we have to dig a lot of holes for poles there. We were in luck, however, as no pole was going to be in a vital area. The boys continued their work on wiring the substation. This work was also being carried out at night.

**18 February.** We started work on the sewer line today and managed to get 100 metres laid. Only 380 metres to go! The Liverpool Street signal box was hoisted into position, followed by its roof, which was clamped in position until we have time to put some screws through the cast iron bracket at each corner. The cable drum stand was moved from 42U to the deck of 99U and our drum of overhead wire was installed ready to use.

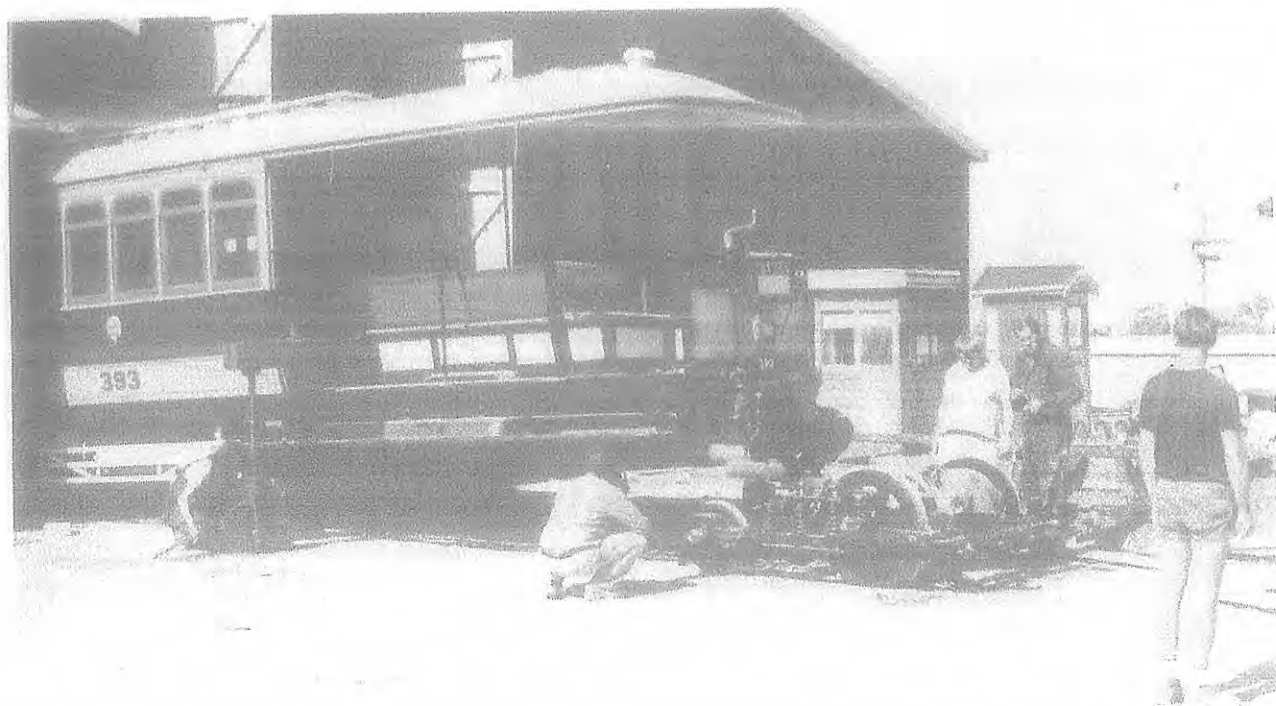
**20 February.** The overhauled bogie was placed under F393 and replaced the Brisbane plate-frame one the car had been sitting on for some time. We moved the car out of Road 4

jacked up the end and made the changeover without any problems. The car was tested at 6.35pm and the test proved successful. We couldn't give it a long run as Road 4 hadn't been connected to the yard trackage yet. Had the best rollup of workers today with 34 signing on. Lots of small, and not so small, jobs being carried out.

**22 February.** The glazier arrived today to start putting the glass in the restoration building windows. All those small panes would take him a few days to complete.

**23 February.** The footing for the wall to the ramp behind the signal box was poured; another two cubic metres of concrete. Work on the sewer line was continuing every day, of course. It seemed never ending.

**24 February.** Eleven poles were erected at the northern terminus. Struck an uncharted cast iron water pipe which proved to be out of use. It was thought to be one from the old steam tram depot but we're not sure where it went. Conduit for our street lighting was put in and work in the substation continued, as did work on the sewer line. The display area in the



*The reconditioned bogie being placed under F 393 on 20 February 1988. The Brisbane bogie on which the car had been sitting has already been moved off the track and towed out of the way.*

BOB MERCHANT

depot was being set up and it was looking good.

**26 February.** The temperature rose to 39 degrees C during the day and working in the sewer trench was a bit like working in Hades!

**28 February.** Our flagpole was erected this morning. Later, the temporary kiosk arrived as did our toilet block. These were positioned clear of future construction work. Another 100 metres of sewer laid. It was going well despite the rock. The first span wire was erected over Tramway Avenue during the afternoon.

**1 March.** The cladding on the restoration building was completed by our contractors. Power was connected to the kiosk and the sewer line reached its deepest point, in the cutting approaching Pitt Street.

**2 March.** Our new drink cabinet arrived and the delivery blokes nearly had a stroke when they saw where it had to go! It went in, no problem! Some work on the track near the scissors crossover was undertaken and our contractors finished the fascia, vent and downpipes on the restoration building — it is now externally complete.

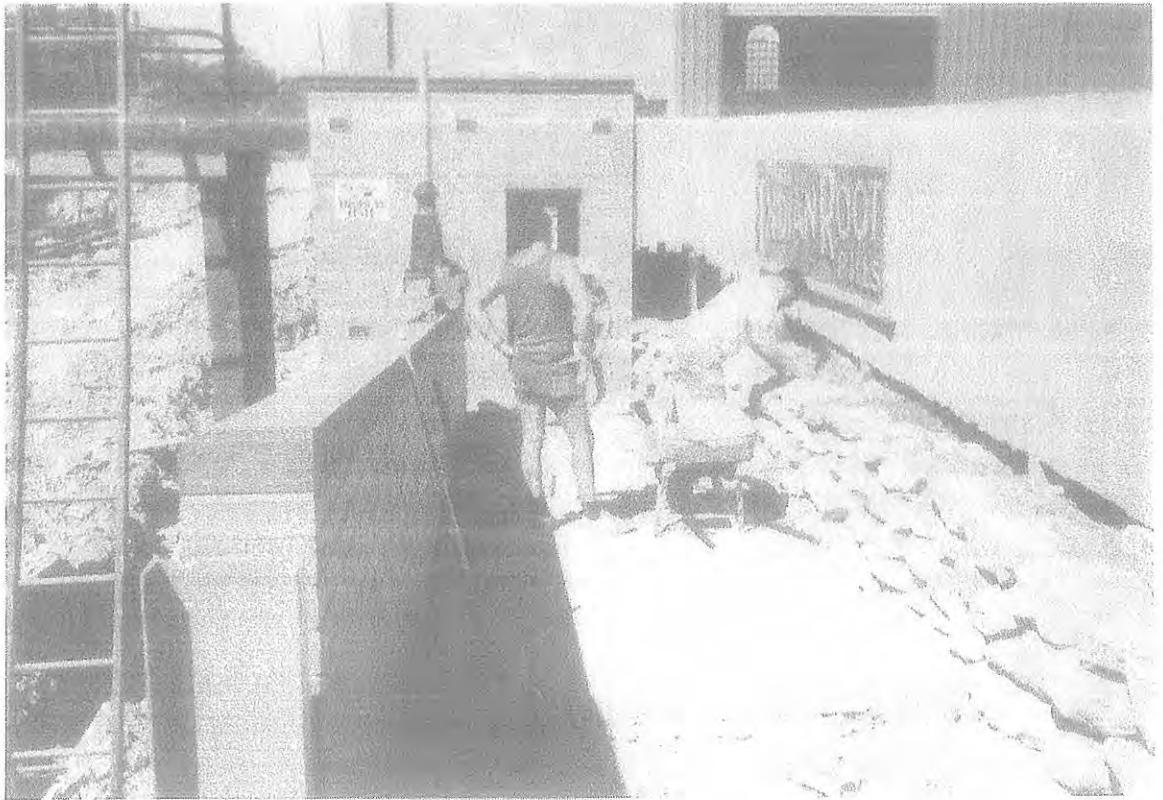
**3 March.** Our weekday workforce varied from six to ten members. Progress was being made in all areas, too numerous to mention in



*The sewer line under construction. This was the easy section! Later, rock was encountered which slowed the construction work considerably.*

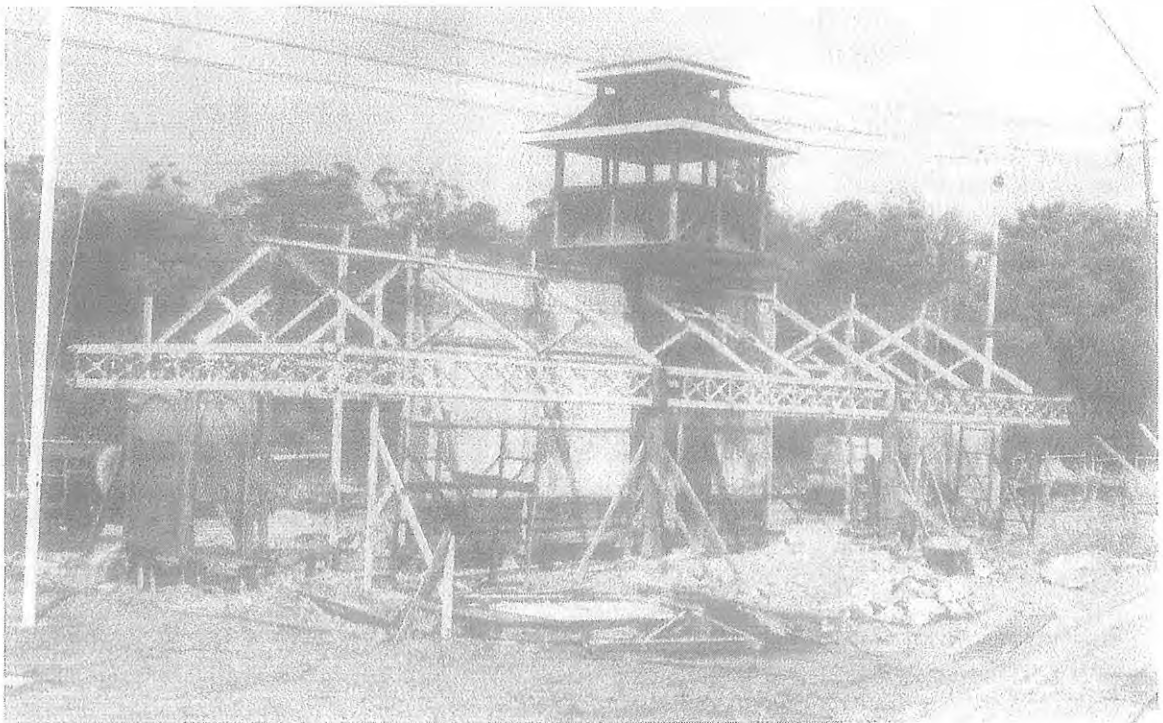
NORM CHINN





*Derek Butler constructs a sandstone wall on the western side of the ramp to the Display Hall. The wooden fence divides the future traverser site from the ramp in Tramway Avenue and is already carrying some vintage advertising. The lamp standard in the background once graced the entrance to Sydney Terminal Station at Railway Square and although broken in half, will be repaired and put into operating condition.*

NORM CHINN



*The Railway Square waiting shed as it appeared in early March.*

BOB MERCHANT





*The erection of bracket arms and span wires in progress on the grade to the northern terminus.*  
VIC SOLOMONS

detail. The starter's cabin received a coat of paint; it is to go near the Railway Square waiting shed. Derek slaves away on that project almost single-handed.

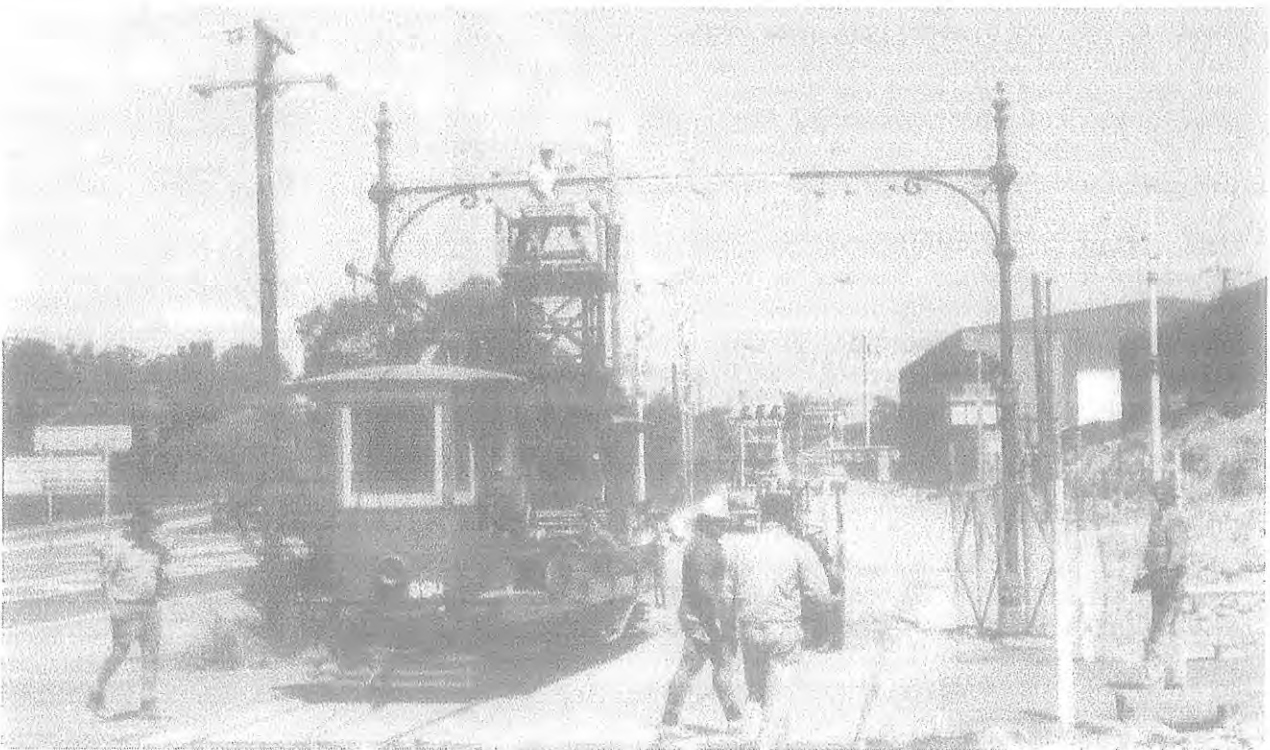
**4 March.** The sewer line crossed Pitt Street today, making 430 metres laid to date. Span wires were being erected in the cutting north of Pitt Street.

**5 March.** It's Saturday and Bob grabbed a group of workers to backfill the sewer trench and fill in the chasms in the ramp to the display hall. Lots of work carried out all over the site. The kiosk will be set up tomorrow when there will be less general activity.

**7 March.** Concreted part of the ramp and put in some gutter along Cross Street next to the picnic area. Eyebolts were installed on the poles along the main line, not made any easier by having to juggle the tower wagon over the rail and sleepers. Dust clouds kept sweeping across the depot yard in the dry conditions.

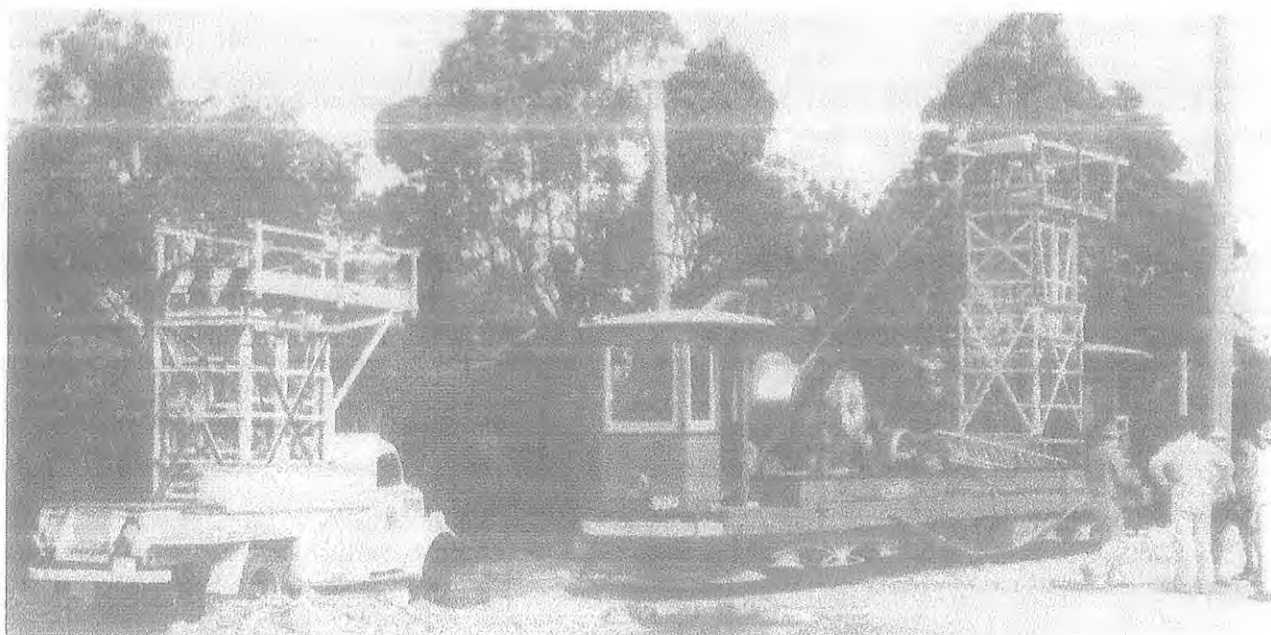
**8 March.** The main switchboard in the substation was switched on at 2.30pm. The sewer was completed and connected to the toilet block, and our old septic tank emptied and dug out. It would have been in the way of our depot extension which will be started later in the year.

**10-11 March.** Overhead cross spans and brackets go up, completing this work on the



*Overhead wire erection in progress. 99U is ready to roll onto the reserved track north of Pitt Street at 1.00 pm on Monday 14 March 1988.*

MAL McAULAY



*The wire reaches north terminus at 4.00pm. The tower wagon will be used to tie the wire off to the terminal pole located to the left of the photographer.* MAL McCaULAY

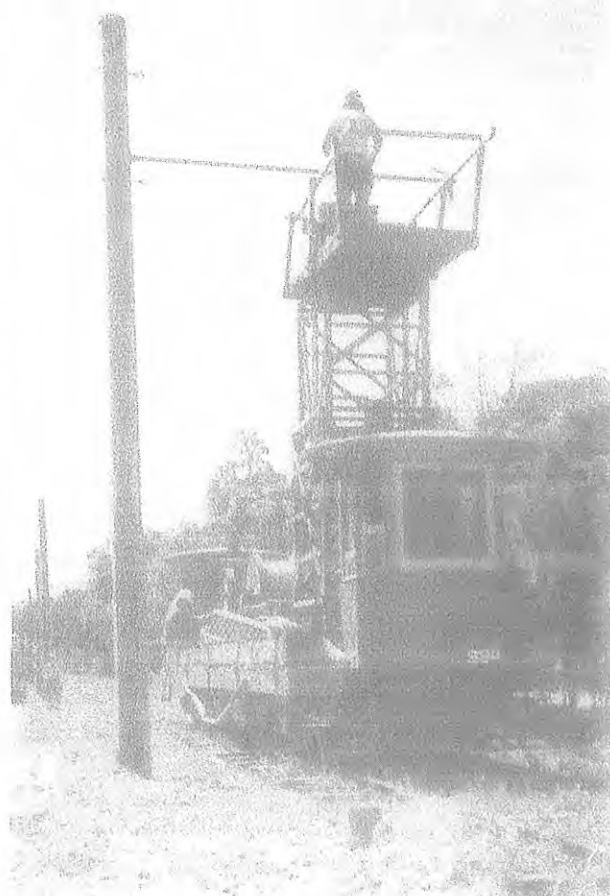
museum site. The display hall was cleaned up and the lighting completed.

**13 March.** All major panels of the Railway Square waiting shed have been completed, the corner brackets fitted and the props removed. This was as far as the reconstruction would go until after the opening. Money was not available at the moment to complete the project. We have been receiving calls from people wanting to know whether we would be running trams for the opening. It seems lack of overhead wiring had been noticed, and with only a week to go people were thinking we would not be running. Little did they know!

**14 March.** Today the trolley wire was erected. The work was carried out quite quickly using 99U towed by the Matador. 99U reached the northern terminus at 4pm, the wire tensioned and tied off to the terminal pole. 99U returned to the depot under its own power at 6.30pm.

**15 March.** The overhead work was completed and a trial run was carried out with 99U. O Class 1111 and P class 1497, with satisfactory results. The northern door stepways of the restoration building, the rest of the ramp and part of the Railway Square waiting shed received concrete today. It seemed to be never-ending!

**16 March.** The connection of Road 4 to the the rest of the system was started today. After all, we need to get the F car out in just three days time!



*Erecting wire along the line. The Matador was used as a towing vehicle and can be seen on the left.* NORM CHINN



*L/P154 has been towed off the trailer by the Matador on 17 March 1988. A bad rail joint is checked before the car is moved into the depot yard.*

BOB MERCHANT



*Minor adjustments are made to the end of the ramp so that R class 1740 can be safely towed from the trailer. The roll on, tow off system of moving trams enables the transfers to be carried out quickly and without the expense of hiring cranes. The rig driver was able to position the trailer rails to the rails on the ramp to within half an inch!*

BOB MERCHANT





Sydney Tramway Museum

No. 2

## SUTHERLAND LINE

### Notice of Opening LOFTUS-SUTHERLAND

**Saturday, March 19th, 1988.**

**The official opening of this  
New Museum Tramway  
will take place at 2.00pm.  
on  
Saturday, March 19, 1988.**

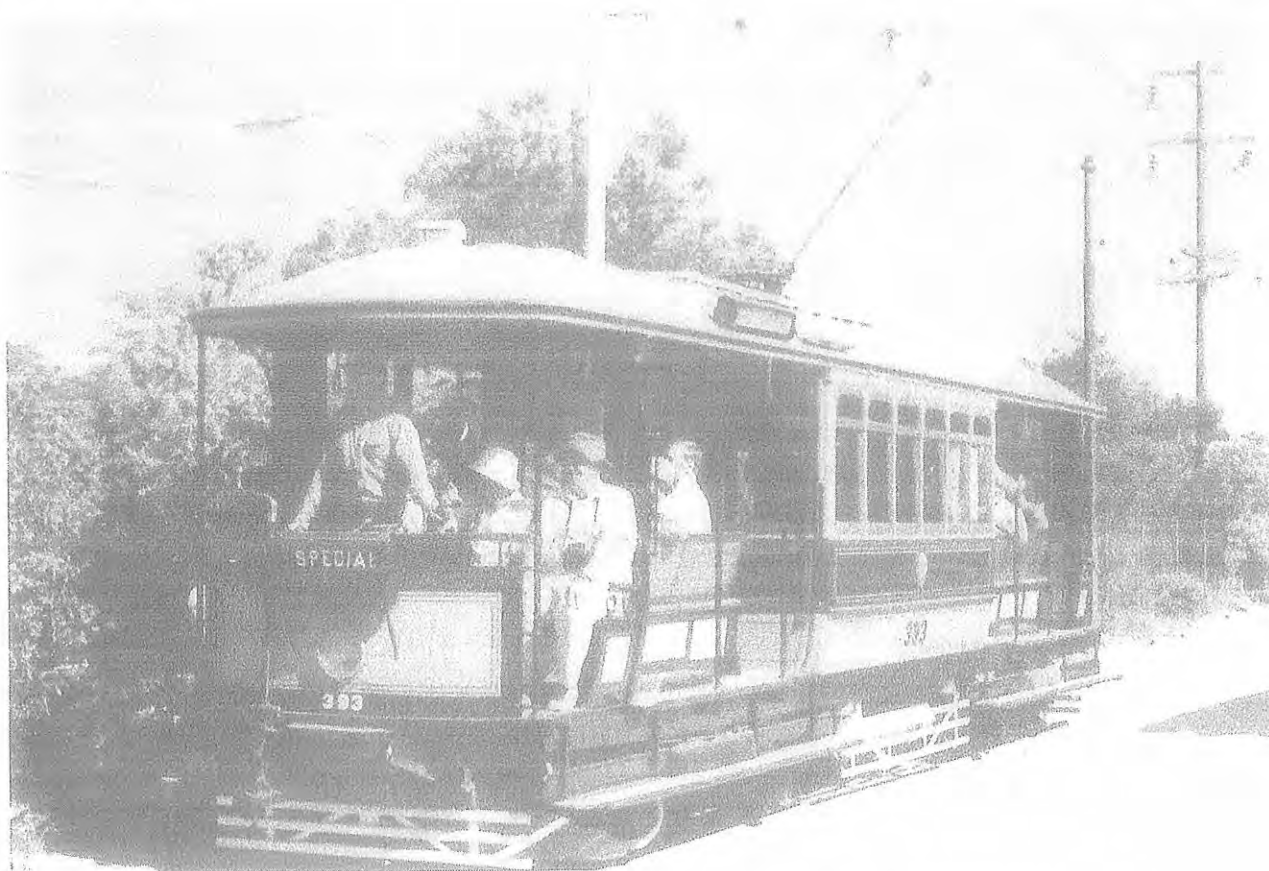
**Regular services  
will commence on  
Sundays, Wednesdays and  
Public Holidays  
from the following day.**

*The connection from the depot approach road to Road 4 was constructed with minimum labour over 16 and 17 March 1988. This construction would allow F393 to be driven out of Road 4, where it had been housed during its repainting, for trials before taking part in the opening ceremonies on 19 March.* BOB MERCHANT

17 March. L/P154 and R1740 were transferred from the old site using roll on, roll off, thus saving the cost of hiring cranes. The transfer worked very smoothly. Not more concrete! This time a slab for the seats next to the signal box, the entrance to the picnic area, and lots at the waiting shed. Despite the fact that there were 31 members working all over the site, only less than half a dozen could be spared to finish off concrete. Late in the afternoon Road 4 was connected. The work sheet for the day simply says "Doing just about everything!"

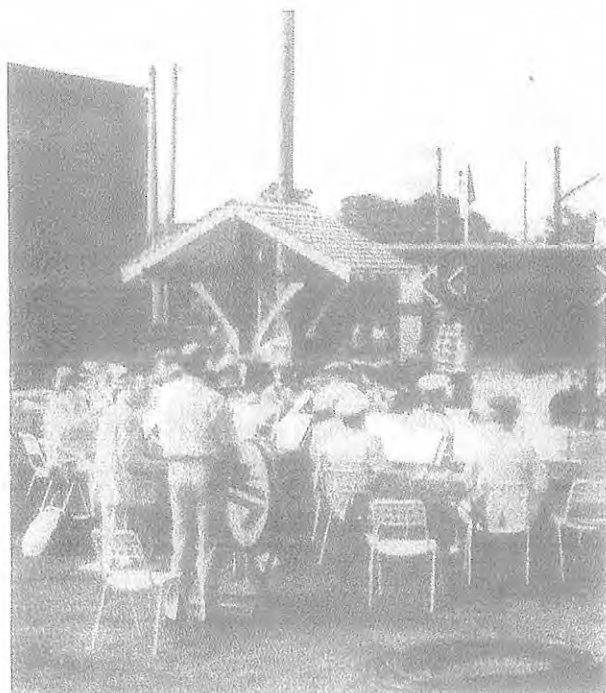
18 March. It was quite impossible to document the work carried out today. However, a break was taken during the afternoon when the F car was taken for a trial run along the line. It carried special mail too, as the tramway museum pictorial postmarker was brought into use at Sutherland Post Office today. A stamp dealer, who turned up to arrange for his covers to be carried by tram, actually helped shovel gravel and assisted us





*On 18 March, workers took a break to ride 393 on its trial run over the main line. 393 also carried philatelic mail to mark the introduction of the museum postmarker at Sutherland Post Office.*

BOB MERCHANT



*The Transport Institute Band played rousing music in the picnic area after the opening ceremonies.*

BOB MERCHANT

to prepare our own covers to mark the occasion. His reward was to ride with us on the trial run, his philatelic items joining ours on the tram. A light breeze blew clouds of fine dust across the depot yard, making it very unpleasant for those who had to work in the area.

**19 March.** Overnight it poured with rain, the first we'd had for over six weeks. The day was overcast with the threat of more rain, but it did hold off. The depot yard was a muddy swamp and Tramway Avenue was little better. The morning was spent shovelling gravel and sand over the worst spots so our visitors wouldn't get too muddy. 99U took tools and workers to the pointwork at the north end to make some last minute adjustments. There was so much still to be done. The dias was set up and the plaque and unveiling kit fixed to the wall of the restoration building. At noon the gates were opened and guests and visitors streamed in over the muddy ground. At 1.00pm we got out of our overalls and work clothes and into something more suitable for the occasion. We glimpsed friends and acquaintances but found little time to chat as there were jobs still to be



*The crowd spreads out along Tramway Avenue as the trams move off. Taken from the rear platform of F393 by Ken McCarthy.*



*O class 1111 moves down Tramway Avenue with its load of passengers. PETER HALLEN*



*The crowd spreads out along the cutting to watch the return of the four trams. O car 1111 approaches Pitt Street as photographers record the scene.*

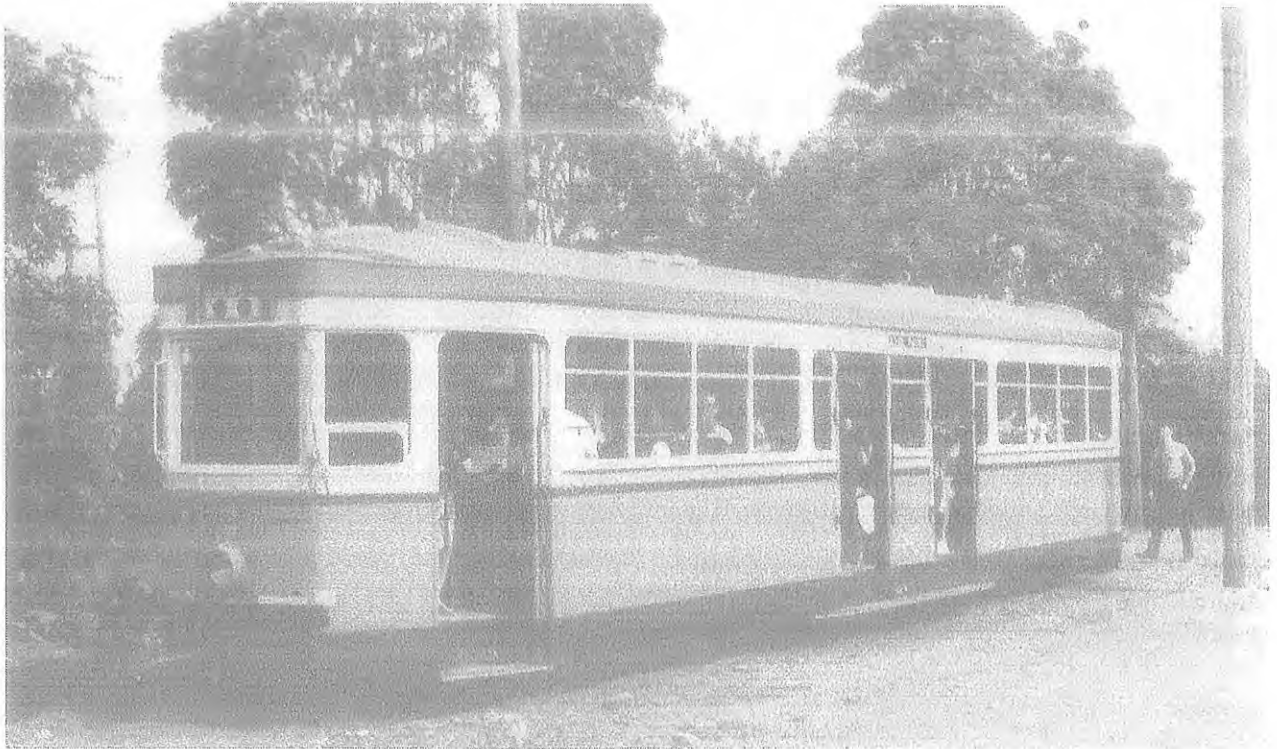
KEN MCCARTHY



*R class 1740 returns to the Museum of the official first run, 19 March 1988. Pointwork for the future double track will be installed immediately behind the tram.*

DENNIS O'BRIEN





*R1740 arrives at the northern terminus with a standing load during the afternoon of the 19 March 1988.*

PETER HALLEN



(TEL. 521 0133)

COUNCILLOR'S SUITE  
ADMINISTRATION CENTRE  
SUTHERLAND 2232  
P.O. BOX 17, SUTHERLAND

7th March, 1988

The Board of Directors  
Sydney Tramway Museum  
P.O. Box 130  
SUTHERLAND 2232

Dear Mr Cowing,

I am in receipt of your kind invitation to attend the Official Opening of the Museum and Restoration Building on 19th March, at 2.00 p.m.

I have much pleasure in accepting and look forward to the occasion with much gratitude.

In the earlier days of your endeavours, I admired the way in which your group battled against great odds and more painful, the apparent lack of interest.

What you are achieving is the perfect example of Community self help and should be displayed as the recipe for others to follow. By your dedication and continual hard work, you all have achieved a major Community attraction and historical benefit. You should all feel justifiable pride.

May I wish you continued success and express my personal thanks for a "Job well done".

Sincerely

Mr. M. T. Tynan

MPT/td

*Typical of the letters received by the Museum is this one from Mr. M.T. Tynan of the Sutherland Shire Council. The praise is very much appreciated by the Museum's workers.*

done. Finally 2.00pm came and we joined the crowd to listen to the speeches, still wondering what we had missed completing. Our invitations gave us seats on one of the four trams to make the official run and we climbed aboard, thinking later that it might have been better to have stayed back and taken photos instead. There was little chance of spending a relaxing half hour over refreshments as there was traffic to run and a kiosk and display hall to man. At 5.00pm the gates were officially closed although trams ran for some time after that. Some members wanted to bat on with a barbeque but I was glad to go home and get some sleep. After all, the next day was our first full traffic day and drivers, conductors, kiosk staff and display hall attendants were needed.

For many workers, the opening day was an anticlimax. For us the joy was in the little successes we had experienced along the way. Despite the solid slog necessary to complete the museum and tramway to its present stage, and the frustration at not being able to complete all the tasks we had set ourselves, we can stand tall for having taken part in what must be one of the greatest efforts put in by a volunteer museum group anywhere in Australia.

Happy Bicentennary, everyone! We did it!!



# SHORT CAR, LONG HISTORY

By W.M. Denham

Most tramcars, it would seem, lead a very mundane existence. They are built, introduced into service, repaired and eventually disposed of with little more reference than several notations in official files.

Sydney electric tram number 102 certainly does not conform to this pattern. It was one of 24 clerestory roofed single truck 'California' combination cars, Nos 98-121, which were available for service during August and September 1899. A further car, 123, was built with an experimental plain arch, elliptical roof and was also added to the fleet at that time. From 1905 the cars were classified 'D'.

D 102 entered service on 2 September 1899 and appears to have spent its whole passenger-carrying life on the main Sydney and Rose Bay systems.

The first time the tram appeared in the official lists in a special capacity was in 1904 when it was released from the workshops on 11 March fitted with the first

Newell magnetic track brake. It was then transferred to Rushcutters Bay depot for trials on the Rose Bay line. These tests were carried out preceding the introduction of this safety feature on trams used on steeply graded lines.

Six of the D cars, including 102, remained in service as single cars. The balance were fitted with air and electric couplings. Each ran coupled, sometimes permanently, to a C class single truck saloon car.

Official records indicate that 102 was modified in March 1909 to be an 'observation car'. The nature of the change is rather obscure, as is the actual use to which the tram was put. It was withdrawn from service for a short time and reappeared on 7 June with driver's protection windscreens fitted. These took the form of short extensions to the underframe and a 'bay window' balcony type enclosure. Many coupling cars received this refinement at the outer (non-coupling) ends in the first instance. No. 102, being a non-coupling car, was fitted with protection at both ends at the same time.

It was returned to regular passenger use in October 1913 and appears to have been transferred shortly after to Ultimo depot where it joined a roster of older cars for specific routes. No. 102, along with sister car 103, may have been set aside for the Cooks River to Dulwich Hill cross country line.

*134s is prepared for unloading in Hay Street in the early hours of 26 June. The Entertainment Centre monorail station is in the background.* Tony Cody





*In a setting reminiscent of narrow European streets, 134s scrubs behind the Capitol Theatre. The tram drew an interested crowd of spectators when the crew stopped in this area for their lunch break.*

Tony Cody

*Scrubber car 134s swings from Hay Street onto the eastern access ramp to Sydney Terminal Station's tramway colonnade. The new trams will show this destination as Central Station, which actually refers to the suburban platforms only. From 1906 to 1961 this location was displayed on tramcar destination rolls as Railway.*

Bob Merchant



The tram was finally retired from passenger service in November 1924 and placed in storage, probably at the Leichhardt depot. This depot had been built for the western suburbs lines between 1913 and 1915 but never opened as a running shed.

The official records indicate that D car 102 was dismantled on 24 November 1924. 'Decommissioned' may be a better word. Trams stored at Leichhardt depot and elsewhere were stripped of usable spare parts but were not generally completely dismantled there. The remains were usually towed to Randwick Workshops to be scrapped or sold.

The D class trams were relatively few in number and for most of their passenger-carrying days were hopelessly overshadowed by more numerous cars in the various high capacity cross bench classes. As a result some were considered redundant after only a few years in service.

The 'non-standard' D car, 123, was transferred to breakdown duty in 1904 as works car 43s. The first D class cars to disappear officially from the Sydney roster were three vehicles (Nos 98, 101 and 110) whose bodies were sold to the Victorian Railways' St Kilda to Brighton line in 1907 to run on broad gauge trucks after the disastrous Elwood depot fire. The balance were withdrawn and written off the books between 1913 and 1925.

On 13 May 1913, D car 117 had been released from Randwick Workshops as a trial track scrubber tram, carrying works car number 112s. It was joined by 131s (ex-D 99) in 1917. Most of the D cars had been stripped of some salvageable equipment before a plan was implemented to convert a number of the cars to track scrubber trams. Eventually seven more D class cars were restored and, including D 123 (as 43s), were converted to track scrubber cars in the 1929-30 period.

On 3 July 1930, D class car 102, now renumbered in the works car roster as 134s, was turned out of the workshops converted to a carborundum track scrubber. In this guise the tram was to see almost another 31 years of service pottering around the system grinding imperfections from the rail head.

After March 1956, D class scrubber car 134s may occasionally have been seen propelling the fire-breathing weedburner car 144s along the reserved track sections of the eastern suburbs lines.

Scrubber cars 134s and 137s (ex-D 119) were retained on the operating roster until the Sydney tramway

system closed in February 1961. No. 137s was sold to the Brisbane City Council Transport Department and transferred north during 1961. It saw occasional use in Brisbane before being withdrawn and dismantled in September 1968. The equipment was sent back to Sydney as spare parts for the Sydney Tramway Museum fleet; the body was burnt.

*The first accredited tram with the first accredited driver on the light rail line. Sydney Tramway Museum member Geoff Olsen and his charge, 134s.*

Bob Merchant





*134s at the corner of Hay and Thomas Streets. The City Council-owned Capitol Theatre, in the background, was extended across half of Hay Street some years ago to enlarge its back stage area for live productions.*

Tony Cody

In August 1961 D class car 102, as scrubber car 134s, was sold for preservation, arriving at the National Park depot on the 14th of that month. It was not until 4 March 1962 that 134s was formally handed over the SPER. It was eventually refurbished and underwent electric trials on 16 August 1964. On 3 January 1965, some three months before the official opening of electric services, 134s was called out to perform the first electric passenger service on the museum tramway. This took place when the petrol railmotor then in use failed at the outer terminus. However, after that date the tram seemed destined to spend its retirement on occasional special trips over the museum's demonstration line.

In 1978, however, scrubber car 134s returned to active service in a rather unusual, if appropriate, role.

*An early morning scene at the corner of Hay and Pitt Streets. The tracks in this area received considerable attention from 134s.*

Tony Cody





In the 1920s, when the City Railway was nearing completion, gangs of workmen were employed to grind the rail surfaces by hand in the tunnels before electric trains could be run to test the automatic signalling system. On open tracks steam hauled passenger and goods trains could be run to clean the rail heads but steam locomotives were generally banned from operating through the city tunnels.

A similar situation existed with the Eastern Suburbs line, although this time goods trains were banned because of the nature of the line. The railway engineers went to Melbourne to see what the Victorian Railways had in the way of mechanised rail grinders. They were directed to the Melbourne and Metropolitan Tramways Board who had scrubber trams. The M&MTB could not release any of their trams so suggested that the New South Wales engineers approach the Tramway Museum at Loftus which had recently received an ex-Sydney track grinder back from the Board.

*134s in Hay Street at the Entertainment Centre stop. A newly installed ticket machine can be seen against the wall of the Market City building on the right.*

Bob Merchant

The engineers visited Loftus, viewed the grinder but decided that the scrubber car 134s would probably do the job more successfully. A deal was quickly struck.

On 13 September 1978, the car was transferred to the remaining section of the Randwick Tramway Workshops for mechanical and structural attention. Here it was coupled to its power trailer and test operated over a short length of track remaining in the workshops yard. Thus it became the last tram to operate in Randwick Workshops, its home for its life as a scrubber tram on the Sydney system.

On 13 October 134s was taken by road trailer to Erskineville to be placed on the Eastern Suburbs Railway. There it was used for track cleaning purposes. Power was supplied by a mobile generator on a tramcar bogie coupled to the tram. The Museum had sought Electrical Branch approval for the railway overhead to be energised at a suitable voltage but this was deemed impracticable for a number of reasons.

When electric trams were towed, usually by steam motor, over the main railway system on transfer up to 1937 special fittings were carried. These were designed to be installed in railway crossings, to be inserted before the tram passed to carry the narrow



tramway wheels safely over the coarse railway crossing grooves. Old details were located and a new set of fittings were constructed for 134s and returned with the car.

No. 134s returned to the National Park depot on 30 December 1978 but was re-hired by the railway authorities for a further period of use, from 24 March to 15 June 1979, immediately prior to the opening of the railway. It was then returned to the Park depot.

On 2 November 1982, the tram was among six cars transferred by road vehicle between the old museum in the Royal National Park to the new museum at Loftus railway station.

The scrubber car was recalled to service yet again on 15 July 1983 to perform a similar duty for the State Rail Authority after extensive re-railing on the Sutherland to Cronulla line. This had been part of major track works carried out during a lengthy railway strike. Had the strike not been settled about the same time, there is every possibility that car 134s would have been transferred over the rail system to other areas of re-railing. It would have lurched and swayed along at a top (permitted) speed of 20km/h towing its power trailer and no doubt loaded to the footboards with SPER members!

On its return from this task the tram was placed on road 8 in the Museum's display hall where it was powered, on occasions, for a short trip through the shed doorway to the end of the rails. It was not until the traverser rails were completed that 134s could be readily retrieved and brought over onto the main system.

After undergoing a thorough examination, service and adjustments, D car 102 (as 134s) was put back into service in April 1996 when it propelled / towed the newly commissioned museum weed control trailer over the system.

By the latter part of 1996 construction work on the new Sydney Light Rail line from Central to Wentworth Park was well advanced and an invitation to our chairman to attend that organisation's Christmas drinks at their new maintenance depot rekindled thoughts of the usefulness of the little car. The offer was made to the chairman of SLR to use either or both of our recently delivered Berlin cars to test the overhead system or our scrubber car to clean the new rails. Nothing further arose until after the delivery of the first car 2103 at the end of May 1997. Noise and ride

tests by ADtranz revealed unsatisfactory results and it was here that Bill Casley from the Department of Transport stepped in and reminded ADtranz of the existence of 134s and its attributes. A visit to Loftus by representatives of ADtranz and TNT Transit Systems, along with Bill Casley was hastily arranged for 11 June 1997 and a demonstration of the car's capabilities provided at National Park. All were convinced and it was then left to them to persuade the track contractors, ABB Engineering Pty Ltd of the need for the tram.

The Department of Transport stipulated a number of repairs to be carried out before the car could be accredited for use on SLR track and the Museum's workshop team set a feverish pace to prepare the roof to equip it with a pantograph from Berlin car 3007 and additional resistances as part of the process to step up its operating voltage from 600 volts DC to the SLR voltage of 750 volts DC.



*The tramway traffic signal turns red before 134s completes its crossing of George Street. The signal sequence is brief as 134s is not fitted with a signal transponder. Later a hand-held transponder would ensure the tram did not conflict with traffic at this busy intersection.*

Bob Merchant

**Submission for Historic Engineering Marker- Sydney Tramway Museum.  
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